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A General Reference Work on

BOOKKEEPING, ACCOUNTING, AUDITING, COMMERCIAL LAW, BUSINESS
ORGANIZATION, FACTORY ORGANIZATION, BUSINESS MANAGEMENT,
BANKING, ADVERTISING, SELLING, OFFICE AND FACTORY
RECORDS, COST KEEPING, SYSTEMATIZING, ETC.

Prepared by a Corps of

AUDITORS, ACCOUNTANTS, ATTORNEYS, AND SPECIALISTS IN BUSINESS
METHODS AND MANAGEMENT

Illustrated with over Fifteen Hundred Engravings

SEVEN VOLUMES

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Foreword

WITH the unprecedented increase in our commercial activities has come a demand for better business methods. Methods which were adequate for the business of a less active commercial era have given way to more elaborate systems and countless labor-saving ideas in keeping with the financial and industrial progress of the world.

¶ Out of this progress has risen a new literature—the literature of business. But with the rapid advancement in the science of business its literature can scarcely be said to have kept pace, at least, not to the same extent as in other sciences and professions. Much excellent material dealing with special phases of business activity has been prepared, but this is so scattered that the student desiring to acquire a comprehensive business library has found himself confronted by serious difficulties. He has been obliged, to a great extent, to make his selections blindly, resulting in many duplications of material without securing needed information on important phases of the subject, except at the sacrifice of much time and patience.

¶ In the belief that a demand exists for a library which shall embrace the best practice in all branches of business—from buying to selling, from simple bookkeeping to the administration of the financial affairs of a great corporation—these volumes have been prepared. Prepared primarily for home study, the authors have striven for simplicity and directness of style and have used a large number of practical problems to further illuminate the text. In addition to the purely accounting and management phases, the newly developed subject of Income Tax has received adequate treatment.

¶ Editors and writers have been selected because of their familiarity with, and experience in handling various subjects pertaining to Commerce, Accountancy, and Business Administration. Writers with practical business experience have received preference over those with theoretical training; practicability has been considered of greater importance than literary excellence.

¶ These volumes are offered with the confident expectation that they will prove of great value to the trained man who desires to become conversant with phases of business practice with which he is unfamiliar, and to those holding advanced clerical and managerial positions.

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PURCHASING AND STORES DEPARTMENT

PURCHASING DEPARTMENT

1. If the old axiom, "Goods well bought are half sold," holds true, the purchasing department may well be considered one of the most important in any business. In referring to the purchasing department we have in mind that department, or division of the business, whose duty it is to attend to the buying. In a large industrial enterprise this may mean a department headed by a purchasing agent with several assistants; in a department store, the buyers for the several departments; in a small retail business, the member of the firm who buys the goods. No matter whether the department be an extensive one, or one requiring but a part of the time of one man, the principle is the same.

Perhaps no other head of a department has greater need of complete information and systematic records of his department, than does the buyer. A man may have every qualification for a successful purchasing agent, but, unless he has the most detailed information to aid him in judging qualities and prices, his cannot be considered a successful department. On the other hand, many a man, with no other qualification than common sense, has built up a most successful purchasing department because his work was thoroughly systematized.

We will consider the purchasing department from two standpoints: The *information required*, and the *routine work* to be performed. Under the first head the requirements may be stated as:

1. List of dealers.
2. Full information about lines carried by each dealer or manufacturer.
3. Records of special quotations.
4. Information about qualities supplied by various dealers, to be obtained from records of past purchases.

LIST OF DEALERS

2. The purchasing agent will have no difficulty in securing a list of dealers. Even a new business is usually well supplied with

circulars, catalogues, and other information showing which dealers handle certain lines. The principal concern of the purchasing agent is to so record this information that it will be instantly available.

In some cases it is found necessary to make special lists of dealers, and these are usually made on cards. A card is used for each article or class of material that may be of interest, and the name of the class is written at the top of the card. Below this are listed the names and addresses of dealers and manufacturers supplying that particular class of material. Since in most concerns this information can be combined with the system of catalogue indexing, we do not show a special form for this record.

CATALOGUE FILING AND INDEXING

3. A purchasing agent must necessarily gather much of the information required in the operation of his department from catalogues supplied by manufacturers. These catalogues are his technical library, in many cases supplying the only available information relative to a particular class of goods. Needless to say, some method must be provided for carefully preserving these catalogues. They must be filed in such a manner that they can be located quickly.

While every office has plenty of opportunities to accumulate an oversupply of catalogues, resulting in a tendency to discard all except those in which the purchasing agent may be interested at the time, it is better to err on the side of a liberal supply. A catalogue that comes in to-day may be of no immediate value, but it may become useful a little later. It would be impracticable to keep every catalogue and circular that reaches the office, but, if it is from a new concern, or offers any new ideas, it should be kept, even though the subject is not of especial interest at the moment.

Many systems of catalogue filing have been devised, and there are almost as many styles of catalogue files on the market as there are manufacturers of such equipment. No one system or style of filing will answer the requirements in every concern. Each must build up a filing system that will conform to existing conditions.

Though a system of universal application cannot be laid down, some general suggestions may prove of value. No matter what the style of receptacle used, catalogues are filed according to one of two methods: The *alphabetical*, or the *numerical*. The alphabetical

method consists in the arrangement of catalogues in bookcases or other suitable devices, according to the names of the publishers. For a small number of catalogues, this is a very satisfactory system, for the very reason that a purchasing agent soon becomes familiar with the catalogues of different manufacturers, recognizing them by their size, shape, or color.

A modification of the alphabetical system is one in which the catalogues are arranged alphabetically by classes; that is, the lines of goods in which the purchasing agent is interested are divided into specific classes. In each of these divisions, the catalogues of all manufacturers listing that class of goods are arranged in alphabetical order. This method is also very satisfactory for a limited number of catalogues.

For a large catalogue file the numerical system will prove the most satisfactory. By this system each catalogue is given a number which should be plainly shown on the back of the catalogue. All catalogues of a specific class are placed in one group, and a series of numbers is set aside for the group. To illustrate, we might have machinery catalogues, numbers 1 to 100. All machinery catalogues would then be given a number in that series. If the number be increased beyond 100, the numbering system would be repeated by using 1*a*, 2*a*, etc.

With the numerical system, the catalogues of each group must be arranged in exact numerical order, so that any catalogue may be instantly located.

4. **Files.** As has already been stated, the style of file, as well as the method of filing, or indexing, must conform to the conditions in each individual office. However, the experience of the past is the best guide for the future. As a general rule, sectional bookcases will be found the most satisfactory for catalogues in bound form, that is, those with substantial covers, and particularly those that will readily stand on edge. An advantage of the sectional bookcase is that all catalogues can plainly be seen, and even though a numerical system be used, a man soon learns to recognize catalogues of certain manufacturers without referring to any number or indexing system.

In every catalogue file will be found pamphlets, circulars, and price lists which are not easily cared for in bookcases. For these a section of a vertical file is recommended, and in many cases this file

catalogue number, and page. The section number refers to the section in the file where the catalogue will be found; the catalogue number to the catalogue itself; and the page to the number of the page in the catalogue. In making up such an index, it is unnecessary to include a long list of articles of no especial interest, but simply those which the concern is obliged to purchase. If an entirely new subject comes up, it can then be listed after suitable investigation.

These cards are filed alphabetically, according to the name of the subject. While in some large concerns a more elaborate file

[illegible]

Fig. 2. Title Card for Catalogue Index

will be necessary, this index can usually be kept in a small card tray in a desk drawer.

When the numerical system of filing is used, another index is necessary to locate the catalogues by name. In most cases our chief concern would be to locate the catalogue by subject, but there are times when it becomes necessary to locate a catalogue by name. To provide for this cross-index, the card shown in Fig. 2 is used. It will be noted that the arrangement of this card is just the opposite of the subject index, the name and address of the manufacturer being given at the top of the card together with the reference to the section and catalogue numbers. On the lower half of the card are listed the names of articles, made by that manufacturer, in which we are interested. This card is also filed alphabetically, but, of course, under the name of the manufacturer. When the number of cards is limited,

Again, a firm will make quotations on several lines in the same letter, which necessitates copying a part of the items or reorganizing the filing system.

In a business receiving many such quotations, it is advisable to reserve a special file for them, but we recommend their being filed according to the names of firms. To provide an accessible record of special quotations, the use of a special form, either on cards or loose leaves, is recommended. While no form universally applicable can be devised, the several forms herein presented are very good examples of forms in use and offer some valuable points for study.

Fig. 3 is a conventional form. This is a card, at the top of which is provided space for recording the name of the article or class of material. Below this is a record of all quotations received, giving date, name of the firm from whom the quotation is received, and initials of the salesman making the quotation, when made in this manner. The columns following are for quantity, or size on which the quotation is based, the list price, discount, net, whether f. o. b. or delivered, and terms. The last two columns are for a record of orders placed.

One of these cards is used for each article or class of material on which special quotations are received. Every quotation is recorded, no matter from whom, and when the card is filled a new one is added. Whenever records on any one card become obsolete, the card can be destroyed, keeping the file up to date.

The cards are filed according to the names of the articles or classes of material. When the number of classes is limited, it will be satisfactory to index the cards by means of a straight alphabetical index. In this case quotations on bolts and all other articles, the names of which commence with *b*, would be filed back of the *B* index. If the number of articles is large, it is advisable to use blank index guides and write the names of classes of material. As an illustration, in some lines of manufacture, bolts will be used in all sizes. On the index would be written the word *Bolts*, and back of this the cards would be filed according to sizes, one card being used for each size of bolt. The same plan can be carried out for each class of material. It is also advisable, in a manufacturing business, to subdivide the file as, between materials—representing materials which actually enter into the construction of the product manufactured—and supplies—representing all classes of factory supplies.

in which it is to be used. The forms shown are presented, not as being ideal for use in all cases, but for their suggestive value.

It is immaterial whether these forms be on cards or in loose-leaf form. That is a question of individual preference, and can only be decided by the person who is to make use of the system.

A good example of a form designed especially for use in a loose-leaf system is shown in Fig. 9. This gives full information about both orders and receipts, furnishing complete information relative to quantities of any particular line handled.

The manner of filing is the same as with the card system, except that these sheets are arranged between suitable indexes in a loose-leaf

NAME OF ARTICLE				STOCK NO.		ORDER NO.				2	
SPECIFICATIONS AND TERMS										4	
										6	
GOODS ORDERED						GOODS RECEIVED				8	
DATE OR ORDER NO.	QUAN.	PRICE	WHEN TO SHIP	FROM WHOM		DATE OR INV. NO.	QUAN.	AM'T	FREIGHT EXP. ETC.	REMARKS	10
											12
											14
											16
											18
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Fig. 9. A Loose-Leaf Record of Goods Ordered and Received

binder. If desired, the order records and special quotations can be filed together. By using forms of different colors the two can be filed in the same index. This is a very convenient arrangement, for then all records of both quotations and orders are found together. In some cases all of the information required will be found on the order records. When special quotations are received they can be filed in front of, or immediately back of, this record.

While in some offices other special records may be advisable, all necessary information for the average office relative to sources of supply, prices, etc., are provided by catalogues and records of quotations and prices described. Any other information required can be provided for by a modification of the forms referred to.

DEPARTMENT ROUTINE

8. Any discussion of the routine duties of the purchasing department is necessarily more or less theoretical and any method of procedure laid down is subject to such modification as will reduce it to a practical working basis for the individual establishment. To present the subject in a practical manner, therefore, this discussion will be confined to the needs of an average manufacturing business. As has been stated elsewhere in these papers, it is much less difficult to modify a system designed to care for all details in a large establishment than to expand the simple systems of a small business.

The duties of the purchasing agent in respect to the actual purchase of goods may be classified as follows:

1. Receiving *requisitions*, or orders for materials and supplies required for stock or in different departments.
2. Placing and following up orders.
3. Checking receipt of goods.
4. Checking invoices for prices.
5. Filing order copies and requisitions.

9. **Requisitions.** Under ordinary circumstances the purchasing agent will place no orders until he has first received a requisition from either the stores department or the department that requires the material. The requisition should in every case state the purpose for which the material or supplies is required, as well as by whom wanted.

Each department should be supplied with its own requisition blanks, and, to make them distinctive, a different color should be adopted for each department. Each department should also be identified by a letter which will be printed on the requisition blank in connection with a serial number. Thus the requisition numbers of one department will start with *A1*, another *B1*, etc.

A positive rule should be laid down that all requisitions issued by one department are to be signed by one person, usually the foreman. This rule must be rigidly enforced and no requisitions honored without the proper signature.

While requisitions should be drafted in a form to meet individual requirements, Fig. 10 is given as a typical example that will be found suitable in a large majority of offices.

The requisition, as a rule, is made in duplicate. The original goes to the purchasing agent and the duplicate is retained by the foreman. In some of the larger establishments a triplicate form is

There are very few cases, however, where this is necessary. It is not a good plan to require the foreman to keep records that can be eliminated, and the average foreman does not care when or where the order is placed; all he wants is the material. He has no interest in going back of the purchasing agent on whom he has made requisition.

When the factory is located at a distance from the office, requisitions should be in triplicate and bear the O. K. of the superintendent

[illegible]

Fig. 10. A Typical Form of Requisition Blank

or factory manager. The duplicate will then be filed in the factory office pending the receipt of the goods.

Foremen who make requisitions on the purchasing agent will retain their copies until the material is received.

On receipt of the requisition, the purchasing agent first investigates to find if the material, or some other that will answer the same purpose, is in stock. If not, he looks up his sources of supply and prices, and then he is ready to place the order. When a large investment is involved, it is usually necessary to obtain special quotations, and sometimes samples, before the order can be placed.

The number of copies will be governed by the requirements of the business. In a small business where the goods are received by the purchasing agent, one copy is sufficient. When a receiving clerk is employed, a second copy will be needed by him to check the receipt of goods.

The illustration, Fig. 12, shows a set of six blanks, the original and five copies, which will meet the requirements of the average manufacturing business. These copies will be used as follows:

RECEIVING COPY
FOLLOW-UP COPY
AUDITOR'S COPY
COST DEPARTMENT
SHOP COPY
ORIGINAL

REQUISITION NO. _____ ORDER NO. _____
TO _____ DATE _____

Please Ship to _____ via _____
on or before _____. If order cannot be filled on date specified,
notify us before shipping. The above order number must appear
on your invoice.

AMERICAN MANUFACTURING CO.
By _____

Fig. 12. Typical Form of Manifold Order Blanks

Original. This is to be mailed or delivered to the vendor.

Follow-Up Copy. This copy is retained by the purchasing agent to follow up the order. It is first filed in a tickler, or date file, back of the date when an acknowledgment should be received. If no acknowledgment is received, the vendor is followed up and the order filed ahead.

The order is next filed under the date when the invoice should be received. After the invoice is received, the order copy can be used to follow up the transportation company for delivery.

Receiving Copy. This copy goes to the receiving clerk who files

In those factories where a receiving clerk, as well as a stores clerk, is employed, the receiving slip should be made in duplicate. One copy will go to the stores clerk with the goods and will later be sent to the purchasing agent, furnishing a double check on the goods. The purchasing agent will send one copy to the cost clerk, first noting the account to be charged. This gives the cost clerk the necessary information for charging out material when used.

One argument in support of this plan is that, having no record of quantities ordered, the receiving clerk will be compelled to carefully count and list all articles received. But it is also true that he is obliged to make a detailed copy instead of merely checking the items against his copy of the order.

Another point in connection with the work of the receiving clerk that has caused much discussion, is the wisdom of furnishing him with a record of prices. The prevailing opinion among manufacturers seems to be that this should not be done. This need not interfere with the operation of our system, for prices can be left off the receiving clerk's copy by using a short carbon. This will keep all blanks uniform in size.

13. Checking Invoices. It may be laid down as a rule that invoices should first go to the purchasing agent, not for audit, but to be checked for quantities and prices. The purchasing agent will check the invoice, note on it the purpose, or the department for which the goods were purchased, and forward it to the auditor. The transaction is then closed so far as the purchasing agent is concerned.

14. Filing. After the O. K.'d invoice has been forwarded to the auditor, the following papers remaining in the purchasing department are to be filed:

Follow-up copy of the order, filed alphabetically under the name of the vendor.

Receiving clerk's copy of the order, filed with the original requisition.

Requisition from the department requesting the goods, filed numerically according to the departmental serial number; that is, all requisitions from *Dept. A* will be filed together in numerical sequence.

When a record of goods received has been made on the forms prescribed, the purchasing agent's records will be complete.

THE STORES DEPARTMENT

15. In this discussion, the *stores department*, or *stock department* as it is frequently called, is treated as a subordinate division of the purchasing department. Properly organized, it becomes one of the most valuable from a profit-making standpoint. Without organization it may degenerate into one of the most useless.

To attain the state of efficiency of which it is capable, the organization and system of operation of the stores department must be of the highest order, otherwise it cannot be expected to fulfill its mission. So much has been written about the failure of stores departments and stores systems to produce desired results, that a statement of what is meant by *stores department* seems to be demanded before we can arrive at intelligent conclusions regarding its functions and operation.

Broadly, the stores department is that department of a business which has the custody of its stock in trade, materials, supplies, and other physical property, except real estate. Reduced to a concrete example, in a trading business the term means that department which is responsible for the storage and proper care of the goods purchased for resale; also the materials and appliances required in the operation of the business. There may be no department known by this name; there may be no one man whose duty it is to supervise the work; nevertheless, the department exists. Every clerk in a small retail store may be a receiving clerk, a salesman, and a stores clerk; or in a larger establishment several men may be employed as stockkeepers; but in both cases the responsibilities of the stores department are shouldered by some one, perhaps by several people.

Like every other department of a business, the organization of a stores department depends largely upon the nature of the business. To furnish an illustration that can be readily understood, we will treat the organization and operation of the stores department from the standpoint of a manufacturer.

ORGANIZATION

16. The stores department is properly under the direct supervision of the purchasing agent. In the last analysis he is the man who is responsible for the maintenance of a stock of materials and supplies which will at all times be adequate for the business. It is proper,

therefore, that he should have supervision over the *receipt, storage, and delivery* of the goods which he has purchased.

In the actual operation of the stores department, the purchasing agent will delegate his authority to the chief stores clerk, who will in turn be assisted by the necessary number of stock men and a receiving clerk. It will be the duty of the chief stores clerk to see that all materials are properly stored, to maintain the records prescribed, and to furnish such reports as may be necessary regarding the movement of the stock. He will have general supervision over the entire department. In the actual physical operations of the department, he will be assisted by stock men who are subject to his orders.

In small establishments the stores clerk also acts as receiving clerk, but in the larger enterprises, a separate receiving clerk is required. He will check the receipt of all goods, deliver them to the storage places prescribed by the chief stores clerk, and make such reports as may be prescribed. While he is, generally speaking, under the orders of the chief stores clerk, he also makes certain reports direct to the purchasing agent.

INVENTORIES

17. There are two classes of inventories. One known as an *actual inventory* and the other as a *perpetual inventory*.

The actual inventory is taken by going through a store or establishment of any sort and listing all the different articles found. Values may be added or not; but for most purposes should be given; when given, they may be either *cost* values or *market* values, depending upon the purpose of the inventory. The articles may also be grouped by departments, or rooms, or by variety. The purposes for which an inventory is taken must control the form and method. The essential feature is a list of the articles though for accounting purposes values must be also taken or supplied.

The taking of an actual inventory involves more or less interference with the work of a plant and frequently its being closed down for a considerable period. This, of course, always involves loss of labor, of time, and a decreased output. In order to obviate, as much as possible, the loss resulting from this procedure, it is common, instead of undertaking to make up completed inventory sheets during the process of taking the inventory, to take first

only a quantity inventory, from which the regular inventory sheets are later made up in the office. The quantity inventory is taken by clerks and assistants as follows: Each clerk is given a supply of tags, ruled as shown in Fig. 14. These are made in the

[illegible]

Fig. 14. Labor-Saving Inventory Tag

form of shipping tags, but larger than the usual sizes used for that purpose. It will be noted that the tag is perforated near the top. The portion above the perforation shows the season and date of inventory, the card number, and the department. The card number and the department are repeated on the lower part

of the card, which is also divided into two parts. The upper half is for an inventory of material, finished stores, and work in process, divided as to *description*, *name of last operation*, the *quantity*, and the *unit*. The lower half is for an inventory of tools, machinery, equipment, and supplies, with provision for the *description*, *quantity*, *unit*, *numbers*, and *location*. By *unit* is meant the unit in which the material or supplies are priced, as pounds, yards, dozens, gross, etc.

The first operation is to attach one of these cards, which are consecutively numbered, to each machine, tool, bin, rack, or pile of material. Then the clerk and his assistants will go through the shop and weigh and count the material represented by each tag, recording the items on the tag itself. As this is done, the lower half of the tag is torn off. Since a record is kept of the card numbers given to each clerk, it will be necessary for him to turn in every one of these stubs, and if care is used in placing the tag on every article before the count has begun, there is no possibility of mistakes.

18. Perpetual Inventory. A perpetual inventory is an inventory determined without inspection. It is an expedient by which to avoid an actual inventory. A perpetual inventory may be instituted at the beginning of a business or may be introduced at any later time by first taking an actual inventory.

A perpetual inventory book is usually only a single-entry day-book-ledger in which accounts are opened, not with persons but, with things—bars of pig iron, bolts of a given size, skeins of yarn of a given quality; or whatever different things the establishment may wish to keep track of. Each account is charged with the number of units of its class that are put into the store's room, or bin, and credited with the number of units taken out. The difference, or balance of each account, must show the number of units, if any, of that particular article, remaining in stock; provided, of course, there has been no error in keeping the record and no additions or withdrawals without record made.

A perpetual inventory needs frequently to be checked by the taking of an actual inventory; because otherwise thefts are apt to occur and to pass unnoticed until the time has passed to effect recovery.

The customary forms used in taking and compiling inventories are shown herewith in Figs. 15-22. It must, however, be remem-

ARTICLE					
DATE	REC'D	DEL'VRD	ORDER NO.	ON HAND	
					A
					B
					C
					D
					E
					F
					G
					H
					I
					J
					K
					L
					M
					N
					O
					P
					Q
					R
					S
					T
					U
					V
					W
					X
					Y
					Z

Fig. 23. Loose Leaf Stock Ledger

bered that any form which may be given is valuable only as a suggestion. What may be excellent for one business may not be at all good for another.

Card Ledger Inventories. A form of ledger which is growing in favor in perpetual inventory purposes is the card or loose-leaf ledger. A good example of the card stock-ledger with ruling suitable for keeping track of purchases, sales, and balance on hand, of any commodity say, of coal, or of potatoes, is shown in Fig. 23.

[illegible]

Fig. 24. Stock Ledger Card

From this card one can readily see not only the amount on hand, but also the amount on hand relative to the amount on

Another form of record which looks beyond supplying data only of what is actually on hand and gives notice of unfilled orders is shown in Fig. 24. This particular cut shows the loose-leaf ledger form with perforated blank for binding, but of course the forms

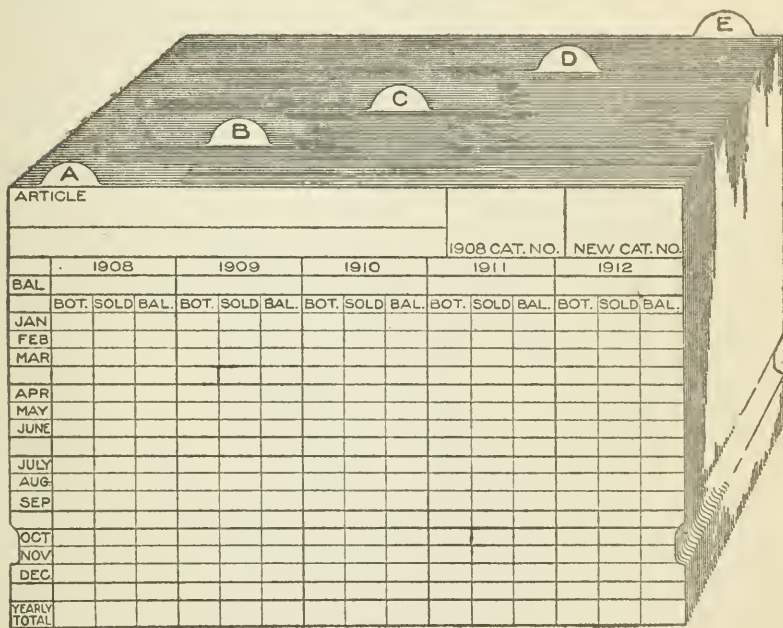


Fig. 25. Stock Ledger Card and Indexes

The form in Fig. 25 goes still further, supplying not only data of quantities received, quantities distributed, and quantity still on hand but also certain cost data and memoranda, based on estimates of the management, on the maximum and minimum requirements beyond which and below which the supply of the commodity should not be allowed to go.

STORES DEPARTMENT A MONEY SAVER

19. Although a stores department is the first essential in the operation of a cost accounting system, manufacturers sometimes hesitate to install such a department on the ground of expense. Without considering its valuable features, the claim is made that the operation of this department involves a larger expenditure than is warranted by the results. But such claims are not borne out by the experience of manufacturers who have tested the efficiency of the department. Where results are found which appear to support this claim, investigation will invariably reveal faulty installation or faulty operation, or both.

Opposed to this claim, the experiences of many manufacturers show that the stores department is an actual money saver. If anything like an efficient cost-accounting system is to be maintained, a stores department is an absolute necessity; but even if there is no cost system, a stores department can be made profitable. An adequate system of records in a well-organized stores department will show at all times the exact condition of the stock, and this alone should justify the maintenance of such a department. Slow moving stocks are pointed out, so that a greater effort may be made to move them; if a stock is running low, the records give warning before the danger point is reached. All this applies with the same force to a trading business as to a manufacturing enterprise. By showing the volume of stock on hand, by pointing out its movements, a stores-record system prevents the accumulation of *dead* stock, yet makes it possible to maintain active stocks at the lowest volume consistent with safety, and thereby saves money by keeping the investment at the lowest possible point.

Surprising results in money saving through stores-record systems have been shown by some manufacturers. In one case which came within the writer's observation, a reduction of more than \$10,000.00 in the average investment was made. A certain manufacturer of machinery, who had an inadequate stores system, found that his stock of material averaged \$30,000.00, while the business required a stock of not more than \$20,000.00. He engaged a competent man to install and operate the system, paid him a liberal salary, and at the end of a year found that his stock averaged less than \$20,000.00. Moreover, the stock was clean—there being nothing in it that was not needed—

was well arranged, and in every respect in a more satisfactory condition than before. That meant a saving of the earnings of \$10,000.00, and by using it in extending his business, the money was worth 20% to him.

INSTALLING A STORES SYSTEM

20. When the inventory has been completed, the next important step in the organization of a stores department is to provide the necessary *storage* places for all materials and supplies and see that these are properly stored.

The question, as to what is a proper storage place is one which must be worked out to fit conditions as found in the individual establishment. Generally speaking, in a manufacturing business, materials should be located as closely as possible to the departments in which they will be used. In a large plant it is usually necessary to have several storerooms to accommodate the various classes of material, and in order that they may be located conveniently. The question of proper storage is a vitally important one in every business, and especially so in a manufacturing plant. Ideal conditions are impossible to obtain in all plants, but the first consideration should be to have a definite storage place for every class of material, and to always keep the material in that especial place. Go into a plant having no well-defined system of storage, and you will find workmen spending more time looking for materials needed than would have been required to take the same material to a stockroom and withdraw it as needed. In trading businesses the necessity for systematic stock keeping has long been recognized. Wholesale houses have their stock arranged in departments and stored on different floors of the warehouse with special men in charge of stock keeping. A retailer, no matter whether he is operating a department store or dealing exclusively in one class of merchandise, has his goods arranged by departments. But in too many manufacturing plants the question of storage for raw material and supplies has received little consideration. A manufacturer will invest dollars in raw material and keep no record of it; yet the same man would regard as preposterous the suggestion that he should keep no record of cash. As a matter of fact, the material should be as well cared for, and as strictly accounted for, as cash. Every dollar's worth of material should be regarded in the same light as a dollar in gold.

Next in importance to the location of the storerooms is the question of the storage of the material itself. The storerooms should be equipped with such bins, racks, shelves, boxes, and drawers as may be required for the proper care of the material. In storing the material the question of its size and weight, and the frequency with which it will be needed, should be considered. Extremely heavy articles should not be stored on the floor, but should be raised to about the height of a truck, thus saving labor both in unloading and loading. Material which is constantly being called for should be kept on shelves that are within easy reach. The top shelves and inaccessible corners can be reserved for articles seldom called for. As far as possible, all articles of the same class should be kept in the same section of the storeroom. Above all, a given article should always be kept in the same place. In some storerooms it is not uncommon to find, hidden away in some dark corner, articles which are not supposed to be in stock, all because no definite storage place has been provided. The record system can be of little value unless the articles are to be found in the sections allotted to them.

All of this but emphasizes the importance of having the storeroom and stores system under the exclusive control of one man. No one should be allowed to interfere with the work of the chief stores clerk. If there is any cause for criticism it should be taken to his superior. Suggestions from foremen and others who are obliged to make use of the storeroom, should, and probably will, be welcomed by the average stores clerk, but no foreman should instruct one of his men to place material in the storeroom except as instructed by its head.

Aside from the storeroom proper, the stores clerk will have charge of material stored outside of the plant. Lumber, fuel, and heavy castings are examples of material coming under this head. Nevertheless, his records should include all of this material, and he should have general supervision over its storage in order that he may more readily determine, or more closely estimate, quantities in stock.

21. Receiving. In the organization of the *stores department*, it is necessary to provide for a record of the *receipt* of all material and supplies. The system must be so constructed that it will not only insure a record of all goods coming into the establishment, but prevent the acceptance of goods which should not be received.

All receiving should, therefore, be in charge of one man. In the larger industrial enterprises, a receiving clerk is employed, whose duty is to receive and receipt for all goods coming into the establishment, and to deliver them to the storeroom or the department in which they are to be used. The stores clerk may, in a small concern, perform all of the functions of the receiving clerk.

When goods come in, the receiving clerk will refer to his file of purchase order copies to find if the goods have been ordered. It will be remembered that an alphabetical file has been recommended for these orders, which are to be filed under the name of the shipper. The reason for this is that the package does not always show the nature of its contents, while the name of the shipper is almost invariably shown somewhere on the package or on the shipping tag.

Goods should not be accepted by the receiving clerk unless he has an order. To do so is liable to cause trouble. As an illustration, we will suppose that the concern has made a contract for material on which deliveries are to be made at stated intervals. The first shipment received shows that the material is not up to specifications and the contract is cancelled. Pending an adjustment, the receiving clerk is instructed to accept no more material on the contract. If he does so, the concern will very likely be obliged to pay for it, and it may even have a bearing on the entire contract.

Another class of shipments which must be carefully watched is the return of goods by customers of the concern. In some businesses, this question is not important; in others, great care must be exercised to insure proper credit. In a manufacturing or a trading business other than retail, the customer will usually notify the house that he is returning goods. When such a notice is received, instructions should be given to the receiving clerk whether to accept or refuse them.

One class of business in which the receipt of returned goods must be handled with extreme care is the installment business. Most installment contracts vest title to the goods in the seller until all payments are made. To avoid payment, a customer may return goods without notice. Acceptance by the seller cancels the contract at once. A safe rule to follow, therefore, is to accept no returned goods until authorized to do so by one in authority.

The receiving slip, Fig. 13, Page 16, is to be filled out by the receiving clerk. One copy will go to the purchasing agent and the

other to the stores clerk. From these reports the stores clerk makes his record of material received. In some cases material ordered for the use of a particular department is to be sent direct to the department and not to the storeroom. A third copy of the report should be made which will be sent to the department, from whence it will go to the stores clerk, properly receipted.

22. Deliveries. The stores clerk, being in custody of all stock, is responsible not alone for its safe keeping but for deliveries. He must be in a position to show what stock has been delivered, to whom, and for what purpose.

There is but one method that will insure an accurate record of deliveries and that is, to deliver no goods without a written order or requisition, signed by one having authority to authorize withdrawals.

Each department, or shop, should be supplied with storeroom requisitions, numbered consecutively with the department number or letter; that is, a requisition from one shop might be numbered *B* 100, another *C* 100. These requisitions should be made in duplicate or triplicate. When the duplicate form is used, the original is sent to the stores clerk and the duplicate retained by the foreman. When the stores clerk has completed his records and the foreman has received the material, both copies are to be sent to the cost department. One copy acts as a check against the other, making it impossible for either the stores clerk or foreman to make false returns. To make identification easy, the two blanks should be printed on paper of contrasting colors. In the cost department one copy should be filed according to the department in which the requisition originated, keeping the numbers consecutive, and the other under the production or job order number. On completion of the order, the latter copy can be destroyed as it will no longer be needed. The departmental copies may also be destroyed, say at the end of a three months' period.

Sometimes it will be found advisable for the stores clerk to retain a copy of the requisition, in which event the triplicate form will be used, two copies being sent to him. He will file his copy by production order numbers, if for material, or by departmental numbers, if for supplies.

All requisitions should provide for a record of prices and values, these to be entered in the cost department. If this is omitted it will

be necessary for the cost clerk to enter the items and extend cost on another blank; when included, he can post values direct from the requisition to the permanent cost records. Place should also be provided on the requisition for the signature of the one who receives the material.

A form of requisition adapted to the use of the average manufacturing enterprise is shown in Fig. 26. This form shows the *department number*, the *date*, the *production order number*, *quantity*, *description*, *cost*, and *value*. At the bottom the necessary *form of*

[illegible]

Fig. 26. Requisition for Material to be Used on a Production Order

receipt is provided. Usually this form will be found adequate for both material and supplies. When used for supplies, the purpose for which they are intended is to be inserted in place of the production order number. Special forms for supplies and repair material are used in some plants. These should differ in color from the *material* requisitions. A form of this character is illustrated in Fig. 27.

STORES RECORDS

23. The installation of a stores-record system calls for the exercise of judgment of the highest order, for the record of material and

supplies is of no less importance than the record of cash. As has already been stated, material should be accounted for with the same fidelity as cash; a dollar's worth of material should be regarded as a dollar in gold.

The stores record system should be an integral part of the accounting system of a business; it should be checked as carefully as any account in the ledger. Only by making the stores record a part of the accounting system can it be operated successfully.

Stores records may be divided into two classes—one recording both quantities and values, and one recording quantities only. Frequently both classes are used in one establishment. In the storeroom

[illegible]

Fig. 27. Special Departmental Requisition for Material

a system is maintained which records quantities without prices; in the cost department a record of values and quantities may be kept.

The records kept in the storeroom are primarily intended to show quantities on hand, or rather quantities that should be on hand. Sometimes these records show prices, but there appears to be no good reason why this should be done. It is better to have all accounting of values done in the accounting department.

The records under consideration are those of the storeroom. These records must show *quantities received* and *quantities issued*, from which a record of the quantity on hand can be obtained. To supply the necessary information, the records must show quantities

of each article or kind of material in stock, which necessitates a system of units. Some articles will move much more rapidly than others; therefore, a bound book is not practical. Either cards or loose leaves can be used successfully, a card or sheet being used for the record of each article.

In order that the records may be instantly available, they must be properly classified. The classifications should follow the same lines as the ledger accounts, which will correspond with the classifications adopted in recording the original inventory. Records of material and supplies should be separated, and each divided into classes. The cards or loose leaves should be filed and indexed according to these classifications.

For example, we will suppose that one division of the material account is hardware. On one index will be written the word *Hardware*, the index forming a main division. Back of the index all cards or sheets recording articles that come in the hardware classification will be filed, these records also being properly classified and subdivided. In the hardware stock will be found screws of several classes, as round-head bright, round-head blued, flat-head bright, flat-head blued. In the *S* section, back of *Hardware*, one index will be headed *Screws*. This division will be subdivided by indexes headed with the names of the classes or kinds of screws. The stores record cards or sheets will then be filed back of these subdivision indexes in the order of sizes. A card or sheet may be used for each size, or several sizes may be recorded on the same sheet.

24. Verification of Stores Records. When indexed in this manner the stores record of any article can be quickly located, and the sectional divisions will assist greatly in verifying the records. While the stores records are intended merely as records of material in stock, their accuracy must be verified by an actual inventory, just as the cash account is verified by a count of cash on hand. However, if thoroughly classified, it is not necessary to verify all of the stores records at one time; they can be verified by sections, or the record of a single article can be verified by an article inventory, without regard to other records.

Accounts in the ledger should be arranged to correspond with the stores classifications, that is, purchase accounts should be carried with materials forming the main divisions of the stores records; as

Hardware, Bar Steel, Foundry Material, Foundry Supplies, and Factory Supplies. When the stock of one class, as hardware, is inventoried, the result should be recorded on the regular inventory sheet, priced, and extended, and the total compared with the hardware purchase account in the ledger. Any discrepancies should be adjusted at once, but if the records are carefully kept, and an inventory of each class is taken two or three times a year, the discrepancies should be practically nil.

If the routine prescribed is faithfully followed, there is no theoretical reason why stores records should not check as closely as cash, with the possible exception of bulk stores, like fuel and ores, where estimates are necessary. Even then, if inventories are taken when these stores are at the lowest point, there should be little difficulty in arriving at accurate results. However, the greatest responsibility rests on the chief stores clerk. He must not let a single pound of material leave the storeroom without an order, for it is on the accuracy of his records that all of the accounts are based. The order copies received in the cost department furnish the basis for all material charges. Here prices are entered and extensions are made. The chief cost clerk will transmit to the chief accountant weekly or monthly recapitulations of all material charged out. The chief accountant will credit his purchase accounts and debit *Manufacturing, Maintenance, Repair, or Expense* accounts as the case may be. *Purchase* accounts thus become *controlling* accounts of the stores records, and the latter takes its legitimate place as an integral part of the accounting system.

RECORD FORMS

25. All forms for stores records, no matter what the class of material recorded, possess certain characteristics in common; yet the information required about each special class is usually of such nature that a special form is advisable. This may mean the use of several forms in the same establishment.

When installing any system, however, it is more economical to invest more money in printing and have forms that fit exactly, than to attempt to make special records conform to forms prepared for other purposes. If certain specific information is required, the form should be designed to exhibit just that information, and if the form

is properly designed, the saving of time both in recording and consulting the record will much more than offset the slight additional cost of special printing.

The number of forms must not be so large as to cause confusion, but against the opposite extreme the cost of time must be considered. It will be found that the value of clerks' time is greater than the cost of printing.

26. **Material and Supplies.** For material and supplies the same form will be found satisfactory in most establishments. The form

[illegible]

Fig. 28. Form for a Stock Record of Materials and Supplies

should provide for the name of the material, the unit in which it is purchased, the purpose for which used, the location in the storeroom, and quantities received and delivered. Fig. 28 shows a form designed for records of this class. In addition to the headings specified above, spaces will be noted at the top of this card for *maximum* and *minimum*. These refer to the quantities of material to be carried in stock and represent the high and low limits. These limits should be established for each article in stock and when any article reaches the low limit a report should be sent to the purchasing agent on the form shown in Fig. 11, Page 14. This form provides

28. **Material Returned to Stock** When a foreman receives an order to manufacture a certain article, or part, he estimates the quantity of material required and draws it from the storeroom. Naturally he does not always estimate the exact quantity; he may run short or have material left when the job is completed.

Unless the material can be used immediately on another job, it should be returned to stock, with a report to the stores department.

[illegible]

Fig. 35. Record of Material Returned to Stock

The form for such a report is shown in Fig. 35. An essential feature of this form is the order number for which the material was drawn, this being the production or shop order number.

When the stores clerk receives unused material and this report, he will enter the quantity on the stores record under the head of *receipts*, and forward the report to the cost department. The cost and value will then be entered and credited on the cost records.

29. **Material Transferred.** When a foreman has left-over material which can be used on another job, a report is necessary to insure credit to the job for which it was drawn and a charge to the job on

which it was used. Fig. 36 is a form for this report. This shows the numbers of the jobs for which the material was drawn and to which the material has been transferred. After entering the correct quantities on his stores record, he sends the report to the cost department. If it is not considered necessary for the stores clerk to make these corrections on his records, the report may be sent to the cost department by the foreman.

[illegible]

Fig. 36. Report of Materials Transferred

MACHINERY AND EQUIPMENT RECORDS

30. In every business enterprise there should be kept a record that will give a full and complete history of every machine or other article of permanent equipment. There are many ways in which such a record will prove valuable.

Not infrequently a new part will be needed for a machine which has been in use for several years. There may be no mark on the machine showing the name of the manufacturer; perhaps no one remembers from whom it was purchased. The result is a frenzied search through books and files—confusion—a vexing delay—all for the want of proper records.

Or, there is a fire, resulting in the loss of a machine costing \$3,000.00 that has been in use two years. The adjuster figures depreciation at, say, 10% a year, or \$600.00. There is no record showing that it cost \$400.00 additional to install the machine, or that repairs have been put on it to maintain its efficiency. At least the depreciation should be figured on a basis of \$3,400.00, the real cost of the machine.

A proper record would show the original cost, the amount expended for repairs and additions, and the amount charged off for depreciation. Such a record should be kept, but no special form is required. The machine inventory form, Fig. 15, answers the purpose. For the more important machinery, one of these sheets should be used for each machine. These sheets constitute a machinery and equipment ledger, controlled by the machinery and equipment accounts in the general or special ledger. Thus the connection between these records and the general accounting system is maintained.

THE TOOL ROOM

31. One department of a factory that is either a source of expense or a factor in saving money, according to the way it is conducted, is the tool room. The tool storeroom is referred to here, rather than the department maintained by large manufacturing enterprises for the manufacture of machine tools.

Every manufacturer is obliged to maintain a complete stock of tools of sufficient size to meet the requirements of his establishment. Unless these tools are properly cared for, the investment is very liable to creep up to a point entirely out of proportion to the requirements.

Perhaps no class of property in a manufacturing plant is so frequently lost as small tools. When no storage place is provided, workmen are liable to leave tools where they were last used. They are soon scattered about the shops and, because they are not readily found, new tools are purchased.

A special tool room is usually necessary, though in some cases the tools can be stored and cared for in the material storeroom. In plants manufacturing machine tools for their own use, the foreman of the tool department can care for the small tools in connection with his regular work. It is also the duty of this department to keep the tools in proper condition for use.

For the storage of tools there should be provided racks and bins in suitable sizes. All tools should be numbered and the sections of the tool rack given corresponding numbers. For example, the stock includes one dozen hammers of a given size and style. This tool is given number twenty and the number is stamped on each hammer. The hammers are placed in section number twenty of the tool rack. At the same time twelve brass checks are stamped with the same number and hung on a hook above the section containing the tools.

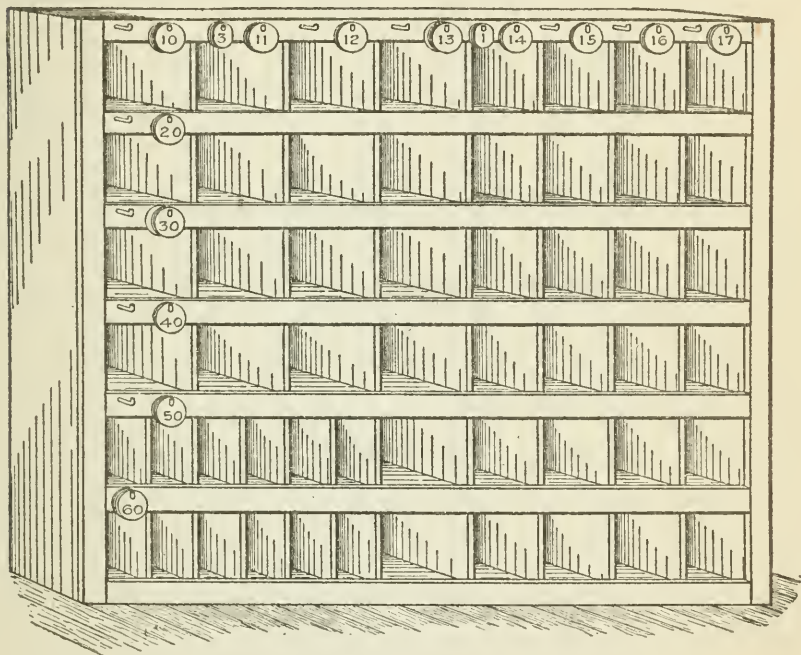


Fig. 37. Section of Rack for the Storage of Small Tools

A section of such a tool rack, showing the number checks, is illustrated in Fig. 37.

There are several methods of keeping track of tools issued to workmen. In some plants a written receipt is required for each tool issued, but this plan is not recommended for the reason that the workman should not be asked to take the time to write a receipt, or to wait until it is made out by the tool-room foreman. He should be given the tool promptly and the system employed should not cause him to waste time.

To overcome these difficulties, the check system is used. There

are several variations in the operation of this system, but, in the opinion of the writer, the double check system is the most practical and satisfactory.

First, the tools are numbered, as described above, and a brass check provided for each tool. Then a board, divided into squares, as shown in Fig. 38, is prepared. In these squares the names or

numbers of the men obliged to draw tools are written. Each square contains two hooks on one of which twelve checks bearing the man's number are hung. When workman No. 2 receives tool No. 15, one of the No. 2 checks is taken from the board and hung above section No. 15 in the tool rack; at the same time one of the No. 15 tool checks is hung on the second hook in the No. 2 square on the board.

It will be readily seen that there must be, at all times, twelve checks in each square on the board, counting both tool and workman's checks. Reference to the tool rack will show how many tools have been issued and what workman has them. The advantage of this system is that it is practically automatic. A perfect record of the movement of tools is kept without the necessity

O TOOL CHECK BOARD				
1 1 14	2 ♡ ♡	3 3 11	4 ♡ ♡	5 ♡ ♡
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
35	36	37	38	39
40	41	42	43	44

Fig. 38. Board on which Tool Checks are Kept

of making entries on cards or in books.

Another method of operating the double check system is to supply the workman with a number of tool checks, these checks bearing the workman's number. When he wishes to withdraw a tool he presents one of these checks, which is hung above the tool rack. One of the checks bearing the tool number is then placed on the hook under the workman's number on the board.

cost, showing quantity manufactured, cost of material, labor, and burden.—When tools are destroyed a record is made showing date and value, and the balance on hand is debited in the last column.

For small tools Fig. 40 is used. This record shows much the same information as for machine tools. The special feature of this form is the record of quantities received from time to time, number delivered and returned, and number destroyed. As a rule, it is unnecessary to record deliveries on this card, though in the case of some very expensive tools, it may be advisable to do so.

Both of the forms referred to above are filed in the same manner as other stores-record cards. The main divisions would be by name, or by departments, with subdivisions according to size.

[illegible]

Fig. 40. Inventory Form for Small Tools

RECORDS OF LABOR AND MANUFACTURING ORDERS

LABOR RECORDS

1. The successful outcome of any project, in whatever field of endeavor, depends on the coöperation of labor. Labor is energy applied. The intelligence with which the energy is applied determines its productiveness. The unskilled laborer applies energy, in the form of his own strength, directly to the task before him. The skilled worker uses his skill to direct the energy of nature that has been applied to propel machines and appliances, which in turn have been created by the skillful manipulation of inanimate properties. Thus the combination of natural forces and the intelligent application of those forces, under the direction of a skilled man, result in the highest degree of productiveness.

In the employment of labor, there are two parties to be considered—the employer of labor and the seller of labor. The desire of the former is to secure production at the lowest cost per unit. The desire of the latter is to secure for his labor, the highest price per unit of time and energy expended. Neither one understands the other, and, too frequently, each one is so intent upon carrying his own point that he deliberately works against the known best interests both of the other and, by consequence, of himself.

The ideal system requires what, perhaps, neither side will consent to, namely, *compensation according to benefits conferred upon society*; or, in other words, in proportion to their respective contributions to the increase of economic goods. Each has an inalienable right to make the most of himself which his abilities and energies will allow; that is, each has right to do exactly as he pleases, provided he does not interfere with the right of any other person to do, in an equal degree, exactly as he pleases. Every employe has right to compensation according to the terms of a *free labor market*. Every employer has right to secure labor

according to the terms established by that same free labor market and each has right, at any time, to withdraw from the field of production. But neither has the right, by indirect and underhanded means to manipulate the conditions of the market or in any way to treat the other in an unfair way.

WAGE SYSTEMS

2. Wage systems, as applied to manufacturing industries, may be divided into the general classifications of day wage, piece rate, and premium systems. Besides these three, there are a number of systems, bearing the names of their originators, which are the result of a combination of certain features found in two or more of the three general methods. A study of modern wage systems necessarily involves a study of the distinguishing features of the three primary methods.

3. **Day Wage.** Of the three general plans on which labor is paid, the oldest and best known is the day-wage plan. It is the most widely used because best understood. The day-wage plan contemplates the payment of a stated wage for a stated unit of time. If all men performing the same task were equally skillful, or if the wage rate could be adjusted in conformity with the varying degrees of productiveness found in every body of workmen, the day-wage plan would be ideal. But neither of these conditions exists.

Workers are liable to insist on the application of the rule of organized labor, that all men performing similar tasks shall be paid the same wage. Since all men are not equally skillful, this results in certain inequalities. On the one hand, the wage rate is based on the lowest rate of production, which is unjust to the more skillful man, who either reduces his productiveness to the level of the least skillful, or transfers his energies to another field of endeavor. As an opposite extreme, the rate is based on the highest rate of production, which is manifestly unfair to the employer.

In actual practice, then, it is necessary, from the standpoint of the employer, to employ overseers to drive all workmen to a maximum rate of production, which, theoretically, means the elimination of all workers who are unable to attain the maximum. Again an injustice results, this time to the weaker man.

4. **Piece Rate.** The first plan evolved, in the search for a plan that would remedy the inequalities of the day-wage plan, was the piece-rate plan. The piece-rate plan contemplates the payment of a stated wage per unit of production, without consideration of the rate of production.

The argument was advanced that a uniform rate per unit of production would result in an equitable wage, because based on the productive skill of the individual. But the plan has failed in many cases to produce the desired results, for the reason that it does not take into consideration the factor of time.

In the establishment of a wage rate, the factor of time must be considered, or the rate will not be equitable as between employer and employe. The employer must furnish the shop, the tools, the power, the heat and light. The cost of these items does not necessarily vary in direct ratio with the increase or decrease in production. These expenses must be absorbed by the finished product, therefore, even under a piece-rate plan, the rate of production (the factor of time) has an actual bearing on the rate per unit.

From the standpoint of the employer, the rate per unit should be based on the productiveness of the individual, and should insure to the most skillful, a wage as high as, or slightly higher than, he would receive under the day-wage plan. This would, in theory, give to the less skillful man a wage exactly commensurate with his skill. But as workers become more and more skillful, and increase at the same time their productiveness and their earning capacity above normal, there is a tendency on the part of the employer to reduce the rate per unit to bring the aggregate wage back to normal. The result is that the worker, fearing a reduction in the rate, limits his production to the number of units that will insure an average wage.

Thus the system fails in its object. It does not reduce the cost of production to the lowest point. However, when piece rates are intelligently applied they are found very satisfactory in certain lines. But in all cases, the piece rate tends toward a uniform rate of production, and, while reducing the cost of superintendence, involves the expense of inspection. The latter, however, is not necessarily an added expense, for, as a rule, inspection is required regardless of the wage system in use.

5. **Premium Systems.** To obviate the difficulties found in both

the day-wage and piece-rate plans, the *premium* or *bonus* system was evolved. This improved system of wages is intended to fulfill the following conditions:

1. A guaranteed rate per hour for each grade of work for a contract period.
2. An average earning power continuously higher than usual.
3. A lower cost per unit to the employer as wages automatically increase.
4. A supplemental earning power, or bonus, to the worker above the day wage, the bonus being based on efficiency.

The premium system is a combination of day wage and piece rate, involving the establishment of standard times for stated tasks. It is based on the theory that if, when a standard time has been fairly established, the worker performs a task in less than standard time, he is entitled to a bonus, or extra pay, for the time saved. The bonus is based on the wage rate paid for standard time.

For what part of the time saved the workman should be paid, depends on circumstances. It might be argued that the workman is entitled to full pay for all of the time saved, but other factors than the dexterity of the workman enter into the time saving. The employer supplies additional power, there is an extra cost for wear and tear on machinery, and an extra quality of material; all have a bearing on time saving. The employer is, therefore, entitled to a part of the saving.

The original premium system is known as the *Halsey* plan. There are, however, several well-known modifications of the plan, all based on efficiency, but each having certain distinguishing characteristics. No more clear presentation of the essential features of the best known premium systems has been made, than is found in a review by Mr. Carl Bender, published in the *Engineering Magazine*, from which the following is quoted:

HALSEY PREMIUM PLAN

To mitigate to some extent the evil workings of piece rates, Mr. F. Halsey invented the premium plan shown in Fig. 1.

The slant of the wage line may be at any angle from horizontal, straight piece rate, to coalescence with day rate line. This system possesses at least four valuable points:

1. It pays day rates if a longer time is taken than standard.
2. It is a very flexible system and can be adapted to different conditions.
3. It lessens but does not obviate the necessity of changing rates.
4. It lessens but does not wholly remove the inclination to limit output.

It is in one respect a step backward, since it substitutes uncertainty for definiteness as to wage costs. Nevertheless, the Halsey system was an admirable step in advance. Usually the worker is given either one-half or one-third the time he saves. Psychologically it is much better than piece rate, since most workers are more inclined to lessen their time than to increase the number of pieces turned out. A man will deliberately decide that he ought not to turn out more than five pieces a day, but he will not feel the same desire to avoid breaking his own record of two hours per piece.

Under the Halsey system, no limit is placed on a man's earning power per hour, and also a minimum piece rate of one-half or one-third the initial rate per piece is allowed, so that if a man worked on his own time, he would at least receive per piece one-half or one-third standard pay.

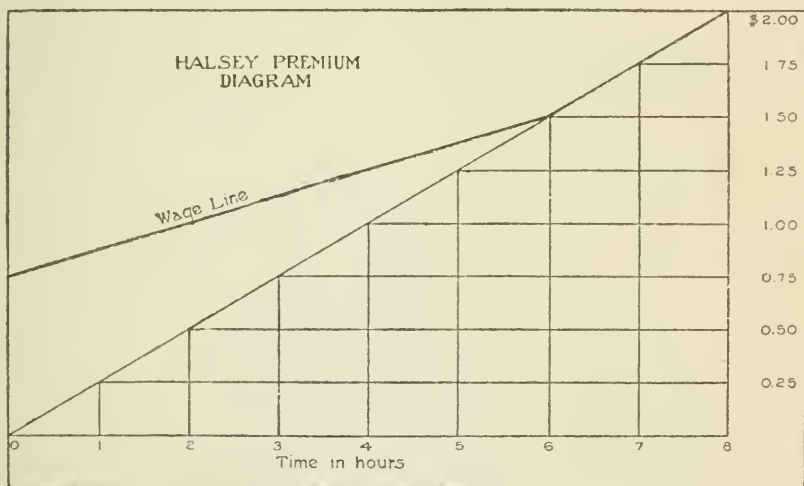


Fig. 1. Diagram of the Halsey Premium Wage System

TAYLOR SYSTEM

A fundamental departure was made by Mr. Fred W. Taylor, in his differential piece-rate system, a diagram of which is shown in Fig. 2. Mr. Taylor does not establish an initial time by guess or by assuming a more rapid gait than on day work, nor does he appropriate other unscientifically determined times. His method is to standardize all conditions in the shop, to make them as perfect and smoothly acting as circumstances will permit, and then to determine a reasonable minimum time in which the job can be done. As a result, Taylor's standard times are very much lower and also very much more carefully and accurately determined than any system hitherto considered. Mr. Taylor scorns the suggestion that by any chance the worker could earn excessive wages. Any wages that an unusually efficient worker can earn are legitimately his own. Assuming that under the Taylor system a worker should do four pieces in four hours, his wages for the time would be \$1.00, but Mr. Taylor allows an increase of 20 per cent, 25 per cent, 30 per cent, or even more, according to the class of work, for ascertaining

standard time. Let us assume 20 per cent increase. The worker then receives for four pieces in four hours, \$1.20, a rate of \$0.30 each. For less than four pieces the maximum hourly rate is \$0.25, therefore \$0.25 each. If the worker only delivers three pieces in four hours, his earnings are only \$0.75, or \$0.1875 per hour. Mr. Taylor's system awards, therefore, a heavy and increasing premium for high efficiency, a heavy penalty for low efficiency.

The method of standard time determination is so rigorous that the worker cannot figure on curtailing his output. He has to hustle to make wages even at the low piece rate, and if he succeeds in this, a very little extra effort will give him a higher piece rate.

The excellence of the system lies in the accuracy with which proper rates are predetermined. It is, however, somewhat inflexible and not so well adapted to work in which unforeseeable variations in time occur.

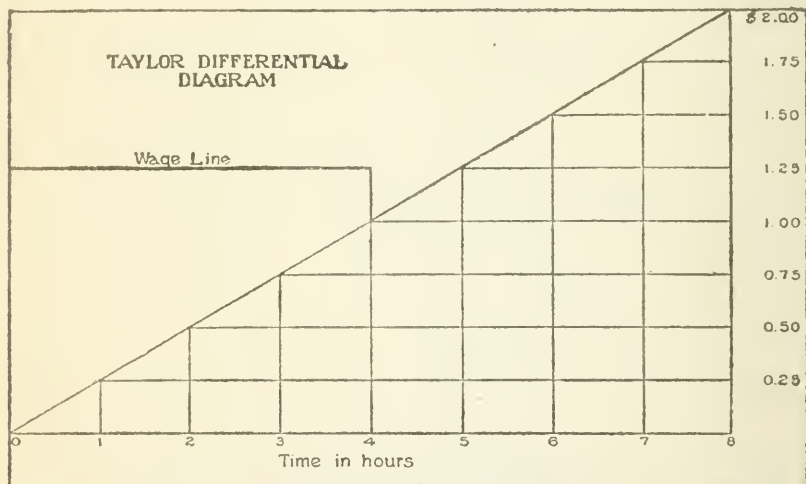


Fig. 2. Diagram of the Taylor Differential Wage System

THE GANTT BONUS SYSTEM

Mr. Gantt, a disciple of Mr. Taylor, introduced at the Bethlehem Steel Company a bonus plan, see Fig. 3.

As in Mr. Taylor's system, the proper time is most carefully and accurately predetermined. If the worker reaches the proper time, he is given a bonus of 25 per cent above normal wages for the time. If he does still better, he is given half of what he makes, as in the Halsey plan. If he does not reach standard time, he is paid only 75 per cent of normal wages for the excessive time, provided bonus earned permits the imposition of this fine. If he had bonus to his credit he would not be fined, however much he fell below standard.

This system has shown certain psychological disadvantages in practice:

1. The men have made it a point of semi-honor, among themselves, not to do better than standard times.

2. Although the actual fines for failing to reach standard times were insignificant, the men claimed that they were being robbed of thousands of

dollars in this manner. Neither fall-downs nor ability to lessen standard time are always up to the man. It is therefore unfortunate when a favorable chance occurs to lessen time, that the worker deliberately holds back. It is also often unjust that he should be fined for what may not be his fault.

Actual experience with these different wage systems brings out the fact that psychology accounts for quite as much as any fair condition, and that a good wage system must not only be fair but must also hit the men right.

EMERSON EFFICIENCY SYSTEM

The most recent wage system is the Efficiency System, evolved and perfected in theory by Mr. H. Emerson and his assistants and practically applied by the officials in the shops of the Santa Fé Railway.

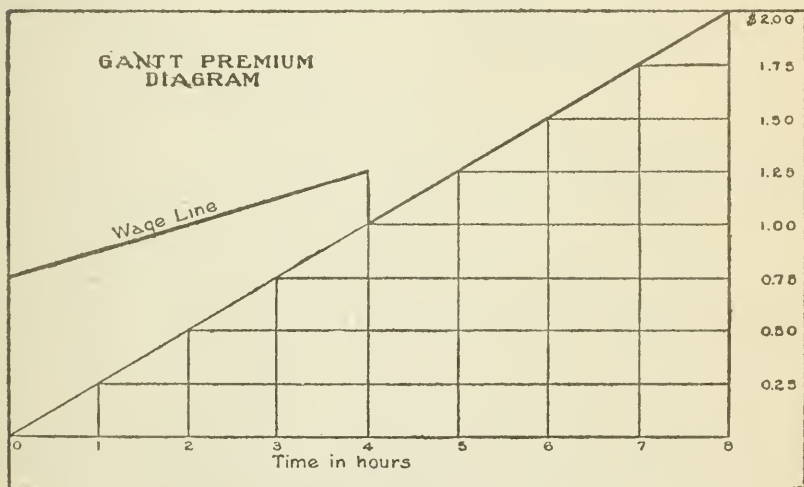


Fig. 3. Diagram of the Gantt Premium Wage System

This wage system superficially resembles the Halsey line, Fig. 4, but in theory and in fact differs radically from all previous wage systems, although it embodies much that was best in all of them. It retains the principle of day pay irrespective of performance. It retains in modified form the principle of a flat piece rate. Like the Halsey system, it pays more per piece for less competent work. Above all, it retains Mr. Taylor's and Mr. Gantt's principle of accurate and scientific shop organization, including standard times for every job and operation.

It pays a high premium above wage or piece rate for coöperation or assistant foremanship on the part of the worker, and finally, as part of regular and daily shop practice, it revises erroneous schedules whether they be too low or too high, and it makes this revision without lessening the earning power of the worker. In addition it substitutes for the costly, annoying, inaccurate time recording of each job, a general monthly efficiency record which covers the shop as a whole, each department, gang, foreman, worker and job, and,

based on accurate study and efficiency, it predetermines, before work is begun, the absolute cost of every operation.

These results are facilitated by recognizing that the attainment of standard conditions as to all operations depends on four totally different elements:

- (1) The shop itself must be highly organized and efficiently operated. This is a duty that devolves solely on the management, and for poor organization and operation the worker is not responsible.
- (2) The character of the work itself, the quality of materials, etc., may vary greatly on the same job at different times. Neither manager nor worker is wholly responsible for this variation.

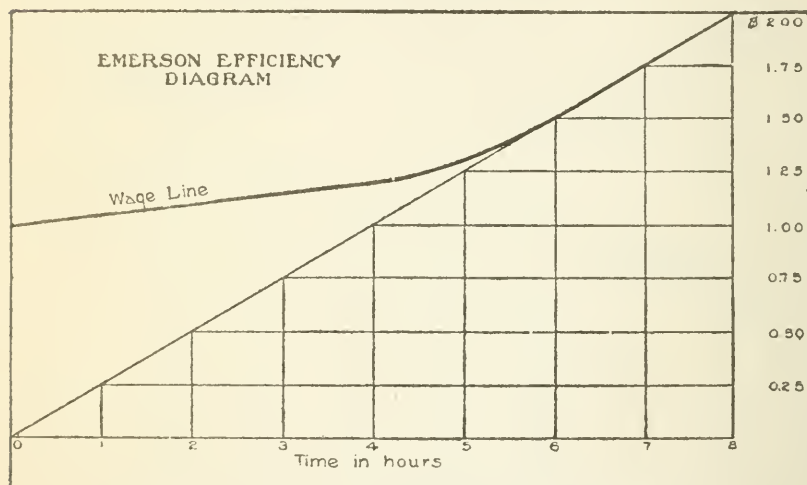


Fig. 4. Diagram of the Emerson Efficiency Wage System

- (3) Assuming standard shop and work conditions, the worker himself can do much to coöperate with the management in making the other conditions as well as himself effective.
- (4) Costs should be standardized for the shop on a basis of normal conditions and be adjusted in the counting room on the basis of the monthly efficiency factor.
 - (a) As an incident to high shop organization and efficient operation, the standard time required for every job should be scientifically ascertained.
 - (b) To eliminate accidental and unavoidable variations in material, etc., the worker is allowed to sum the standard time of all his jobs, gaining on some, losing on others, averaging closely even.
 - (c) For coöperating with the management in eliminating wastes, the worker is paid a 20 per cent bonus for the efficiency of 100 per cent, which means, that the time taken for all his jobs must be equal to the standard times allowed for all his jobs. If he takes 10 hours on a 1-hour job and 1 hour on a 10-hour job, his average remains 100 per cent.

- (d) The same work is assumed to be done always in the same standard manner. Variations from standard are a general charge or credit to shop efficiency, not a specific variation in cost. A train passenger is not charged more because his train has been delayed by a snowstorm, or less because a fair wind and a clear track made the particular train run less costly than usual.

Under the efficiency system the worker is entitled to standard day rates, even if he is doing nothing. If, however, by reason of special individual effort or skill, he does his work faster, he is entitled, not to a part (one-third or one-half, as in the Halsey system), but he is entitled to be paid in full for all the time he saves. As he has not less coöperated with the management, he is, in addition, entitled to 20 per cent bonus for all the time he works.

Therefore, if a worker whose pay is \$0.25 per hour delivers 300 hours of jobs in a month of 250 working hours, he receives:

1.	250 hours at \$0.25.....	\$62.50
2.	50 hours saved, at \$0.25.....	12.50
3.	20 per cent on 250 hours' pay.....	12.50
	Total.....	<u>\$87.50</u>

If, however, the worker does not so coöperate with the management as to make the shop operate at high efficiency, himself included, he does not receive as much extra pay, but a lessening amount until at 67 per cent and below he is paid day rate and no more.

The diagram shows plainly the efficiency wage line beginning at 6 hours, showing 20 per cent increase at 4 hours, standard time, and paying 4 hours time even if the work took no time at all—a condition that arises practically quite often, as when a worker runs two jobs at the same time, or when he does work on his own time.

While the diagram can be applied to a 4-hour job, the worker is not paid by the separate job, but is paid straight day wages and a bonus for his full-pay period efficiency. For each per cent of efficiency there is a corresponding increase in pay.

For 100 per cent efficiency the increase is 20 per cent, and for each 1 per cent increase in efficiency above an efficiency of 100 per cent, the pay also increases 1 per cent; therefore, for 120 per cent efficiency the pay is increased 40 per cent. Below 100 per cent the pay table runs as follows:

Efficiency Per Cent	Additional Pay Per Cent
67	0.00
74	1.
80	3.27
85	6.17
90	9.91
95	14.53
100	20.

The system has other merits:

- (1) It standardizes not only the work of each worker, but also of every foreman, every department, and of the shop as a whole.

- (2) It therefore standardizes the shop cost of every job, whether it is done by a cheap apprentice in two hours, or a high priced mechanic in 10 hours. The average shop or department efficiency factor equalizes accidental variations.
- (3) It separates absolutely all questions of wage rate from questions of output, shop conditions, or individual excellence.
- (4) It fines the management heavily if shop conditions are not maintained so as to realize standard times.
- (5) It puts no limit on the ambition or earning power of any man.
- (6) Standard times are being constantly corrected. If the standard man cannot average 100 per cent on his schedules, it is evident that some of them are too short and ought to be lengthened. If on the other hand, a new machine tool is introduced, new schedules are drawn up for it, but the worker will not, on that account, make less than he did on the old schedule.

It is too much to expect that any system of paying wages will prevent an outbreak of selfish interests whether of employer or wage earner. There will, however, be a distinct gain if the nature of the disagreement can be made entirely distinct and plain. Clear thinking must precede clear acting, and this description of different wage systems may contribute towards clearer conceptions and more just practice.

To establish a modern wage system, standard times must be determined on a scientific basis, and the rate must not only be equitable as between employer and employe, but, as Mr. Bender has said, "it must hit the men right." Shop conditions must be right and every facility given the workmen to attain standard time or better, including teaching him how to do the work in standard time. The *speeder* or *task setter* employed under the day-wage plan must be superseded by the *instructor*, who, instead of selecting the most speedy worker and basing standard times on his operations, first determines as closely as possible what the time should be, and then teaches his men how to attain that time. Where stop-watch methods foster discontent and breed antagonism, instruction is followed by coöperation. The average man does not object to doing a task in a stated time when he is given the facilities for doing the work that will make that a reasonable time. Add to this the incentive of extra pay for equaling or bettering that time, and his coöperation is insured.

METHODS OF TIME KEEPING

6. Time keeping may be divided into two classes. The first class includes methods of recording the total time that the employe works during a pay-roll period. The second class includes methods

of recording the results of the labor of each employe—the quantity produced, expressed in the units adopted by the trade in which he is employed.

Ordinarily, trading concerns require records of the first class only, the pay of the employe being based on the time spent, rather than on the quantity of his production. This is because of established custom and the difficulty of measuring his production. Primarily, the pay of the employe is based on his efficiency, but it is not always practical to attempt to reduce the results of that efficiency to standard units.

Manufacturers require records of both classes. Not only is it necessary to know how many hours each employe has worked, but the quantity of production must be known.

It is true that a manufacturing business requires the services of some employes whose productiveness is not readily expressed in standard units, in which cases the first method only can be used. These are the men who are necessary to the economical operation of a department or shop, or of the plant as a whole, but whose time cannot be charged to a particular job. Labor of this class is termed *indirect* or *nonproductive*.

The labor of most employes in a manufacturing plant is applied directly to the production of specific articles, or to the completion of certain definite jobs. This makes it possible to reduce the results of their labor to definite units. Labor of this class is termed *direct* or *productive*.

Records of production, as well as records of time, are necessary for two reasons. First, when the piece rate or the more modern premium system is used, employes are paid according to the number of units produced. Second, to obtain accurate records of costs, it is necessary to have accurate records of production.

For the purpose of determining the amount of wages due the piece worker, time records are not needed; records of production supply the information required. But to determine the actual labor cost per unit, time records are needed even in the case of piece workers. Piece rates are based on continuous production at a uniform rate. A marked falling off in production means a perceptible increase in the cost per unit for overhead expense. For example, we will suppose that a manufacturer has \$50,000.00 invested in machines operated

by piece workers. One of the definite items of expense to be apportioned to the product of these machines is interest, at say five or six per cent. If production falls to one-half of the normal quantity, because one-half of the machines are idle, the amount of this one item of expense that must be borne by each unit of production is doubled. Or, we may have two workers operating identical machines on the same class of work, the production of one being twice that of the other. The overhead expense is the same for each employe and each machine, consequently the cost of the finished product is affected by the factor of time. The piece worker who fails to maintain the rate of production established as standard in his or her trade, is not a profitable worker.

7. Time-Keeping Systems. There are several systems or methods of time keeping in use. No one system is adapted for use under all conditions. Like all other classes of records, the time-keeping system must be selected with reference to the conditions under which it is to be operated. The system used in a factory, where all operatives are housed in one or more buildings, is not well adapted to the needs of a contractor whose men may be working on jobs located at points widely separated.

In this discussion, we will consider first the systems used to record the total time employed. This will be followed with descriptions of systems for obtaining records of production.

8. Time Book and Check Systems. Of the time-keeping systems that have been at some time considered standard, the oldest is the time book kept by the timekeeper. This system required the timekeeper to identify each man at work, and to record, opposite his name in the time book, the number of hours worked each day. Sometimes a special timekeeper was employed, or the foreman might keep the time book for his own men, the time books of all foremen being turned in for the purpose of making up the pay-roll. A system so dependent on the memory of one man never could become satisfactory.

With the object in view of doing away with the mistakes that were continually being made in the operation of the time-book system, the check system was introduced. This was probably the first attempt at automatic time recording.

Under the check system, each man is assigned a number and

given a brass check on which his number is stamped. In entering the works the men are required to pass in front of the timekeeper's office and to hand in their checks. The timekeeper has, in his office, a large board with hooks numbered to correspond with the check numbers. As the checks are handed in they are hung in their proper places on this board. The checks on the board show what men are in the works, and from them the necessary entries are made in the time books.

When the men pass out at noon their checks are handed to them. Every man must pass out and take his check; otherwise he will not receive credit for the half-day's time.

The system does not prove entirely satisfactory for several reasons. It is not exact, for no accurate record of the time a man enters is possible. Usually the timekeeper's window is closed at starting time and opened fifteen minutes later to take care of the late arrivals. Thus the man who is one minute late pays the same penalty in lost time as the man who comes in fifteen minutes after the whistle blows. As a natural result, when a man finds that he cannot reach the works on time he takes the full fifteen minutes.

While the handing in of a check furnishes reasonable proof that the man has entered the works, it furnishes no proof that he is at his work. Many a man has turned in his check in the morning, left the works by another exit, returned a few minutes before noon, received his check and full pay for the half day.

In some manufacturing plants where the check system is still used, this difficulty has been overcome to a certain extent. The operation of the system is reversed, the men receiving their checks from the timekeeper as they enter the works. In the shops there are check boards on which the men hang their checks. These boards are hinged and provided with locks, the keys being carried by the foremen. Five minutes after starting time the boards are locked, and late arrivals are required to turn in their checks to the foreman who makes records of the time of arrival. Once during each working period, the timekeeper makes the rounds of the shops and takes the time records in his time book. At the quitting hour the boards are unlocked, the men take their checks as they pass out, and turn them in at the timekeeper's office.

9. **Time Clocks.** The modern system of time recording makes use of a time clock or mechanical recorder. Instead of trusting to the accuracy of a timekeeper, or depending on the workmen to keep records of their own time, the modern recorder automatically records the time of arrival and departure of every employe.

Mechanical time recorders, or time clocks, are of two general types, making two classes of records. One type records the time of one employe on a single card or sheet; the other makes a record of the time of several employes on the same sheet. For recording the total time of employes, both types are used, and certain advantages are claimed for each.

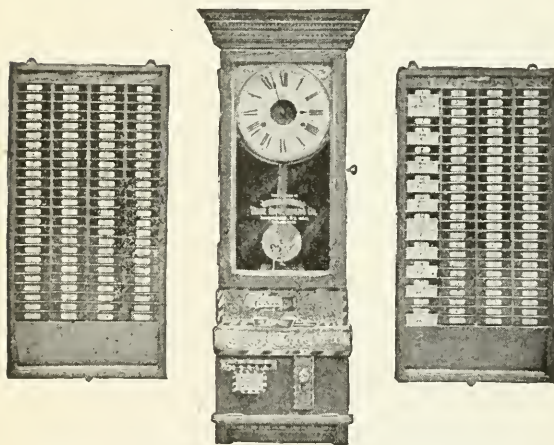


Fig. 5. Rochester Time Recorder, Manufactured by International Time Recording Co.

The records of the first type, most generally used, have a card for each employe on which a record is made of his time for an entire week or pay period. In operation, this system is very simple.

At each side of the clock is a card rack, as shown in Fig. 5. One of these is an "out"

rack, the other an "in" rack. At the beginning of each week or pay period, cards are placed in the numbered pockets of the out rack, which is nearest the entrance—one card for each man. These cards bear the numbers or names of the men, or both if desired.

When the employe enters, he takes his card from the out rack, places it in the slot of the clock, makes an exact record of the time of arrival by moving a lever, and places the card in the proper numbered pocket in the in rack. When he leaves, the operation is repeated, this time the card being deposited in the out rack. In the meantime the recording device in the clock has been shifted so that it records the leaving time in the proper column on the card.

The form of record made by one of the best known clocks of this type is shown in Fig. 6. It will be noted that the recording device prints the letter representing the day of the week in front of each record

—out or in. Another feature is the dash under the afternoon registrations; a glance shows whether the registration was made at, for instance, 6 o'clock in the morning or afternoon.

This form requires an exceptionally small number of entries to figure the time for the week. In the outside column, at the right, is entered the time lost or the overtime for each day. At the end of the week, the net total of this column is added to or subtracted from the total hours representing a full week, which gives the total number of hours actually worked.

WEEK ENDING, FEB 9 - 1907

No 20

NAME. *Wm Brown*

DAY	MORNING		AFTERNOON		EXTRA		TOTAL
	IN	OUT	IN	OUT	IN	OUT	
MON	6:55	12:01	12:56	6:01			
TUE	6:59	12:05	12:57	6:11			
WED	6:58	12:01	12:55	3:30			-2½
THU	6:53	12:03	12:51	6:08	6:58	10:02	+3
FRI	7:30	12:04					-5½
SAT	6:57	12:08	1:01	6:05			
SUN							
TOTAL TIME..... 55..... HRS.							
RATE..... 27½							
TOTAL WAGES FOR WEEK \$..... 12.34							

Fig. 6. Weekly Time Pay Card Used in the Rochester Recorder

Clocks of the second type record the time of several employes on one sheet, the record being made for one day, or for any number of days up to a week. Like the card machine, the record shows the in and out time, both forenoon and afternoon.

A recorder of this type is illustrated by Fig. 7. To register the time of arrival or departure, the employe places a key, bearing his number, in the clock, and gives it one turn. A bell rings, indicating that the hour and minute of the day have been printed on the record inside the register.

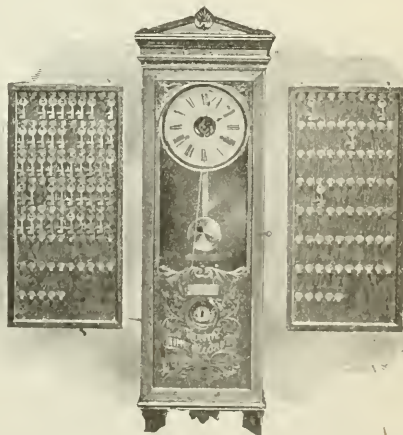


Fig. 7. The Bundy Time Recorder, Manufactured by International Time Recorder Co.

Time Slip for Week Ending <i>June 8, 1924</i>							TOTAL TIME	RATE PER DAY	AMOUNT DUE
NAME	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY			
1. Geo. Failing	658 12 01 12 24 10 4	641 12 02 12 24 10 1	639 12 03 12 37 10 0	658 12 00 12 31 10 0	610 12 05 12 30 10 1	652 12 00	5 1/2	2 00	11
2. Fred Smith	658 12 02 12 27 10 5	655 12 02 12 26 10 4	653 12 01 12 27 10 2	645 12 00 12 21 10 4	642 12 00 12 30 10 0	651 12 00	5 1/2	1 50	9 10
3. John Foley	657 12 02 12 30 10 3	12 22 10 3	647 12 59 12 27 10 00 - 1/4 H	700 12 01 12 20 10 2	645 12 01 12 00 10 2	700 12 02 - 1/4 H = 1 1/2	5	3 00	14 12 1/2
4. May Herane	707 12 02 12 26 10 2 - 1/2 H	635 12 00 12 17 10 3	650 12 04	650 12 03 12 33 10 5	651 12 00 12 50 10 1	700 12 20 - 1/4 H = 10 1/2	5	4 00	19 10
5. Mable King	658 12 03 12 46 10 0	635 12 01 12 17 10 2	623 12 00 12 26 10 1	654 12 01 12 28 10 0	700 12 00 12 25 10 4	642 12 01	5 1/2	3 00	16 50
6. Frank Griffin	659 12 07 12 00 10 9	710 12 10 12 40 10 1 - 1/4 H	634 12 00 12 30 10 0	645 12 02 12 19 10 2	659 12 02 12 36 10 0	650 12 02 - 1/4 H = 5 1/2	5 1/2	1 1/2	10 1/2
7. Mike Keller	654 12 09 12 38 10 1	654 12 09 12 38 10 1	638 12 00 12 14 10 0	652 12 00 12 43 10 1	653 12 00	653 12 00	3 1/2	2 00	7
8. Joe Gans	656 12 04 12 49 10 6	700 12 02 12 30 10 0	650 12 02 12 18 10 3 - 30 10 0	653 12 10 12 15 10 1	659 12 00 12 21 10 3	642 12 10 + 1/2 H = 1 1/2	5 1/2	1 50	9 12 1/2
9. Tom Clark	656 12 04 12 26 10 7	651 12 02 12 14 10 3	650 12 00 12 28 10 2	645 12 01 12 32 10 0	645 12 02 12 21 10 4	655 12 01 + 3/4 H = 10 1/2	4 1/2	2 00	9 10
10. Ida Miller	659 12 00 12 21 10 3	700 12 00 12 28 10 2	658 12 00 12 28 10 2	644 12 03 12 24 10 6	655 12 15 12 15 10 2	648 12 03	5 1/2	2 00	11
11. Carrie Nation	658 12 01 12 24 10 4	100800 641 12 02 12 24 10 1	639 12 00 12 37 10 0	659 12 00 12 31 10 0	610 12 05 12 30 10 1 - 3/4 H	652 12 00 + 3/4 H = 3 1/2	5 1/2	3 00	16 50
12. Mollie O'Brien	658 12 02 12 27 10 5 - 650900	655 12 02 12 26 10 4	653 12 01 12 27 10 2	645 12 00 12 21 10 4	642 12 00 12 00 10 0	651 12 00 12 12 10 2	5 1/2	4 00	13 2 1/2
13. Jack West	657 12 02 12 30 10 3	648 12 02 12 00 10 3	647 12 09 12 27 10 0	650 12 01 12 20 10 2	645 12 01 12 01 10 0 - 1/4 H = 8 1/2	653 12 01 - 1/4 H = 8 1/2	5 1/2	3 00	16 1/2
14. Billy Brown	657 12 02 12 26 10 2	635 12 00 12 17 10 3	702 12 04 12 22 10 3 - 1/4 H	650 12 03 12 33 10 5	651 12 00 12 02 10 3 - 1/4 H = 10 1/2	700 12 03 - 1/2 H = 10 1/2	5 1/2	2 00	10 10
15. Jack Johnson	658 12 05 12 48 10 9	635 12 01 12 17 10 2	623 12 00 12 26 10 1	654 12 01 12 28 10 0	700 12 01 12 25 10 4	642 12 01	5 1/2	1 50	8 1/2
16. Minnie French	659 12 07 12 50 10 9	654 12 07 12 36 10 1	634 12 00 12 30 10 0	645 12 02 12 19 10 2	658 12 00 12 36 10 0	650 12 02	4 1/2	1 50	6 1/2
17. Mary Connel	652 12 02 12 48 10 2	654 12 07 12 36 10 1	638 12 00 12 14 10 0	652 12 00 12 43 10 1	700 12 00 12 28 10 2	653 12 00	5 1/2	1 50	8 1/2
18. Cora Long	656 12 04 12 49 10 6	700 12 02 12 30 10 0	650 12 02 12 18 10 3	653 12 00 12 15 10 1	642 12 10	642 12 10	4 1/2	1 50	6 1/2
19. Jim Stack	656 12 04 12 26 10 7	651 12 02 12 14 10 3	656 12 12 12 14 10 1	645 12 01 12 32 10 0	645 12 02 12 21 10 4	655 12 01	5 1/2	2 00	11
20. Ethel Mason	659 12 05 12 21 10 3	700 12 00 12 28 10 2	658 12 00 12 25 10 2	700 12 03 12 24 10 6	655 12 15 12 15 10 2	648 12 03	5 1/2	1 50	7 1/2

Fig. 8. Weekly Time Record as Made by the Day Time Register

The form of record made by machines of this type is shown in Fig. 8. The records of all employes appear in numerical order on one sheet, with the various *ins* and *outs* in their proper columns. The record is inside the clock, under lock and key, and when removed can be used as a pay-roll sheet.

The fact that the complete record is on one sheet, is one of the advantages claimed for this type of recorders. On the other hand,

WORK ORDER		Order No. _____	
Mr. _____ <i>You are instructed to do the following work, reporting your time on this order.</i>		Date _____	
Instructions		Time Started	
		Time Finished	
		Total Time	
		Hrs	Min.
		Rate	Amount
<i>Report Material Used Here</i>			

Fig. 9. Work Order with Time and Material Records

an advantage is claimed for the card machine in the fact that the cards can be used for other purposes, such as for cost records.

PRODUCTION TIME RECORDS

10. All records of time on individual jobs or operations may be termed *production time records*, since the ultimate object of keeping such records is to determine the cost of production. To the manufacturer, these records are fully as important as those showing the total time worked by each employe. Without such records, a satisfactory cost system is impossible.

produced. Such a record is used for machine operations when a large number of similar pieces are operated on by a single machine. The time record is made when one order number is finished and a new one started. The form shown provides for an extension of rates and amounts, the extensions being made in the cost department.

Fig. 12 is a card for recording a day's operations, arranged on somewhat different lines. This card is a series of perforated coupons,

Man No. _____		Date - _____
Name _____		
Order No. _____	Operation _____	Hrs. _____
Man No. _____	Date _____	
Order No. _____	Operation _____	Hrs. _____
Man No. _____	Date _____	
Order No. _____	Operation _____	Hrs. _____
Man No. _____	Date _____	
Order No. _____	Operation _____	Hrs. _____
Man No. _____	Date _____	
Order No. _____	Operation _____	Hrs. _____
Man No. _____	Date _____	
Order No. _____	Operation _____	Hrs. _____
Man No. _____	Date _____	
Order No. _____	Operation _____	Hrs. _____
Man No. _____	Date _____	
Order No. _____	Operation _____	Hrs. _____
Man No. _____	Date _____	

Fig. 12. Coupon Time Card for a Day's Operations

turns them in to the cost department. Here, the time cards are compared with the clock records to find if all of the time for which an employe is paid has been accounted for. The time records for individual jobs are then transferred to the cost records. For the latter purpose, the coupons can be distributed by order numbers. This makes it convenient to retain all time coupons until the job is finished, when the amounts can be transferred to the cost records with a considerable saving of labor in the cost department.

There is one serious objection to any form of time card designed

one for each job on which the employe works. When a job is finished, the record is made, the coupon detached and turned in. At the close of the day the top of the card, with all unused coupons attached, is turned in

All of these forms for recording the time of an employe for an entire day are handed to the foreman, who

for a day's record. Too much depends upon the accuracy and clerical ability of the employe. The average factory or shop operative has had no experience in keeping records. He does not appreciate the importance of the time records he is expected to keep, and, naturally, becomes careless. Knowing that a record is expected, his card will show full time, but the distribution of that time to separate jobs is not accurate. Frequently, he waits until the close of the day and makes as close a guess as possible as to the time worked on each

Order No. _____						Part No. _____						Date _____	
Man No. _____						Name _____							
Operation No. _____						Class of work _____							
A.M.						P.M.							
✓	10	20	30	40	50	1	10	20	30	40	50	Hrs. Regular	
8	10	20	30	40	50	2	10	20	30	40	50	Hrs Overtime	
9	10	20	30	40	50	3	10	20	30	40	50	Rate	
10	10	20	30	40	50	4	10	20	30	40	50	Amount	
11	10	20	30	40	50	5	10	20	30	40	50		
12	10	20	30	40	50	6	10	20	30	40	50		
Remarks _____													
OK. _____ Foreman													

Fig. 13. Job Card with Time Chart

job. His failure to keep accurate records is not due to unwillingness, but to his lack of training in such work.

Exceptions are found, as a matter of course, and in some industries the general character of the operatives employed is such as to practically insure intelligent record keeping. As a rule, however, it is unwise to expect the factory employe to keep accurate records.

13. Job Time Cards. A method of time keeping which is an advance over the daily time card, is the use of a separate card for each job. With this method, accuracy of the records can be practically insured and the employe relieved of much of the clerical labor.

To attain satisfactory results, it is necessary to operate this system along somewhat different lines than that described for the daily time card system. Instead of issuing cards for the entire day, the workman should be given a new card with each new job on

which he works, and not until he has completed the job last worked on. The time must be recorded and the card turned in to the foreman on completion of each job.

It is the duty of the foreman to keep his men supplied with work, and to have at all times a job ahead. The workmen, knowing that a record of his time on each job is kept and compared with the clock record, will naturally insist on having a new job card when each old one is turned in. If no job is ready, it will be necessary for the foreman to issue an *idle* or *nonproductive* card—a condition which he

JOB CARD				
Order _____		Shop Order _____		Date _____
Article _____		Drawing No. _____		No. Required _____
Name _____		Card No. _____		Machine No. _____
OPERATION				
Cores	Turning	Splining	Slotting	Babbitting
Moulding	Boring	Planing	Keyseating	Assembling
Chipping	Drilling	Milling	Tapping	
Commenced Date _____ Hour _____				
Finished Date _____ Hour _____				
TOTAL TIME <div style="display: inline-block; width: 100px; height: 30px; border: 1px solid black; border-radius: 50%; vertical-align: middle;"></div>				
Hrs. _____ Min. _____				Foreman _____

Fig. 14. Job Card Showing Names of Operations

will strive to avoid—all such time becoming a direct expense charge against his department.

To relieve the employe of clerical labor, a card, similar in form to Fig. 13, is used with quite satisfactory results. The special feature of this card is the provision made for obtaining a record of time. Below the heading there is a form representing the time of day, each hour being divided into ten minute periods, and the whole divided between forenoon and afternoon.

When a new job is started, the workman makes the record by checking the time in the proper space. On completion of the job, he makes a similar check mark in the space that indicates the finishing time. The exact time is computed in the cost department.

To illustrate: Suppose a job is started at 7 A. M. and is done in $6\frac{1}{2}$ hours. The time will be checked at 7 A. M. and again, if an hour is allowed for lunch, at 2:30 P. M. This really shows $7\frac{1}{2}$ hours elapsed time, but in the cost department, the lunch hour will be allowed for, and the computed time will be correct.

Another form of job card, intended for use where jobs require more than one day, is shown in Fig. 14. With this card, it is intended that the starting and finishing time shall be entered in the ordinary way, and the name of the operation checked.

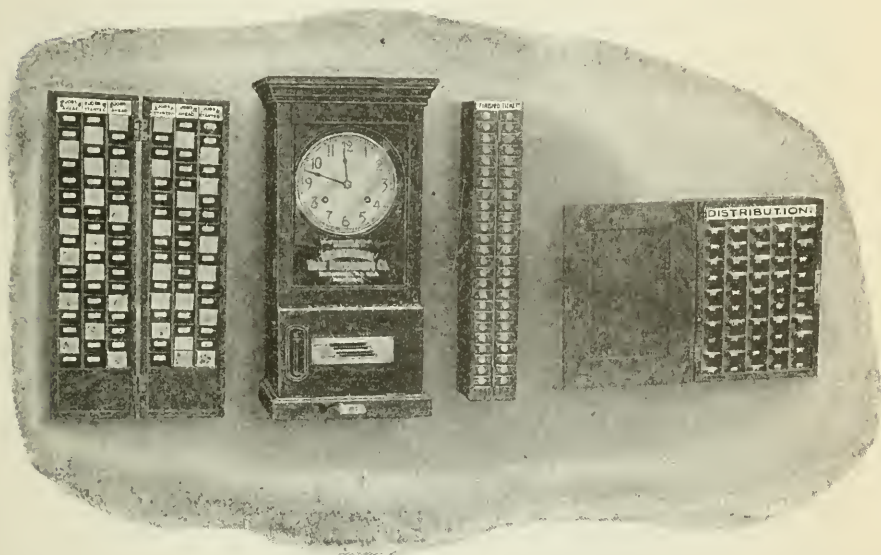


Fig. 15. Day Time Register for Production Time Records, Manufactured by International Time Recording Co.

14. Mechanical Time Recorders. For the same reasons that they are best for making records of total time, for pay-roll purposes, mechanical time recorders are best for obtaining production time records. Whether the responsibility of making the record rests on the workman or a clerk, it is always better to have the actual recording done automatically whenever it is possible to do so.

While the time recorders used for keeping total time are also used for obtaining production time records, there are certain advantages in using recorders of slightly different types. Manufacturers

have made great progress and are now supplying machines which answer every requirement.

One type of recorder designed for production time records is shown in Fig. 15. This outfit includes, in addition to the recorder, a rack for jobs ahead and jobs started, a rack for finished jobs, and a distribution rack. The first rack contains pockets of the right size to hold time cards or tickets. These pockets are numbered to correspond with the men's numbers, two pockets being provided for each man, one for jobs ahead and one for jobs started. The rack for finished jobs is divided into compartments bearing the men's numbers, with slots through which the cards are inserted. The distribution rack is divided into compartments numbered for the different jobs.

Employees No. 653	Job No. <u>\$2743</u>		Date <u>June 18</u> 190 <u>6</u>	
	For <u>Syracuse Rapid Transit Co.</u>			
	Kind of work	<u>Trimming Brushes</u>	Stopped	<u>2 140</u>
	Quantity of Piece Work	<u>8</u>	Started	<u>2 806</u>
	Quantity of Time Work			<u>1 16</u>

Form No. 251

Fig. 16. Individual Job Card Used with the Day Time Register

The recorder and card racks are placed near the foreman's desk, which should be at a central point in the department. The foreman prepares cards for the different employes and places a card for the next job in the *jobs ahead* pocket. The workman, when starting to work, takes the card for the next job, records the starting time, and places the card in the *jobs started* pocket. When the job is finished he again records the time, on the same card, and places the card in the compartment bearing his number in the *finished jobs* rack. At night, if he has an unfinished job, he records the time, the same as for a finished job, and either turns in the card to the foreman or places it in a box kept for suspended jobs. The foreman then makes out new cards and places them in the *jobs ahead* rack, while the suspended card is placed in the *finished jobs* rack.

Every morning all cards of the previous day are taken from the *finished jobs* rack, the time recorded on each man's cards is com-

puted and compared with the record of the total time recorder, and the cards distributed by job numbers in the distribution rack. This checks the job time with the pay-roll time, and permits of leaving the cards in the distribution rack until the entire job is finished.

NAME	ARTICLE OR DESCRIPTION	OPERATION	Q. USED	Q. REMAINED	DATE	PRICE	TOTAL
James M. Harris	Iron spindles	Drilling	4	9	11-11-1	701	354
	6.00 Iron	Drilling	50	50	11-11-1	698	354
	100	Drilling	100	48	2-11-4	647	346
		Drilling	77	74	3-14-2	767	530
		Drilling	44	44	11-17-8	842	284
		Drilling	20	20	5-10-1	744	346
		Drilling	20	20	5-10-2	807	330
		Drilling	40	38	2-5-5-1	725	744
		Drilling	20	20	5-10-2	745	258

Fig. 17. Job Time Sheet Used with the Dey Time Register

The cards are then taken to the cost department and the time records distributed on the cost sheet.

One form of card used with this type of recorder is shown in Fig. 16. One card is used for each job on which a man works.

It will be noted that the time is recorded in decimals. Instead of the usual 12 hours, the recording wheel is divided into 24-hour periods, or if desired, into 23 hours, automatically eliminating the noon hour. The 23-hour wheel prints 12 at noon and again at one o'clock, 13 at two o'clock, etc. At 3:30 P. M., for instance, the clock would record 14.50, meaning $14\frac{1}{2}$ hours. On the card illustrated, the record shows the job to have been started at 8.08 and finished at 11.40, the elapsed time being 3.32 hours.

A clock of similar type accommodates a sheet of any size, and provides for as many separate time records on the same sheet as

may be desired. A sheet may record the time of a single employe for an entire day and show the exact time worked on each job. Or, in some industries, the card may be made for a job and arranged to accumulate the time of all employes working on the job. Fig. 17 shows how several time sheets of this class can be bound together, making a daily time and pay sheet for each employe. From this sheet the time is distributed to the cost sheets.



Fig. 18. The Calculagraph, Manufactured by the Calculagraph Company

Still another type of time recorder, which offers certain distinct advantages, is shown in Fig. 18. This machine is used to obtain a time record for each employe on each separate job or operation.

The distinctive feature of this machine is that it records the elapsed time. When a man commences work on a new job, he places his card in the machine and by moving a lever registers the starting time. When the job is finished, he again places the card in the machine, this time moving a second lever, and registers the exact time that he has worked on the job. The advantage is apparent. With an ordinary time stamp printing the starting and finishing time, it is necessary for a clerk to mentally compute the elapsed time. With this machine the elapsed time is mechanically computed and printed, saving the time of the clerks and doing away with all possibility of clerical errors.

Fig. 19 illustrates the form of record made by this machine. The record shows that workman No. 38 commenced work on job No. 530 at 9:45 A. M., that he was employed on this job 2 $\frac{8}{10}$ hours, and that the operation was milling.

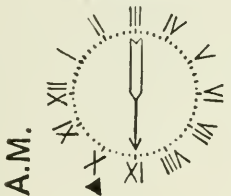
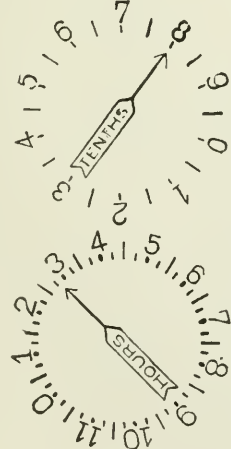
Job No. 530			MACHINE SHOP			Workman No. 38		
A.M. 			MAR 5 1906 COMMENCED			TIME EMPLOYED 		
Boring	Drilling	Grinding	Planing	Tapping	Time Allowed	Premium Credit	Foreman	
Chipping	Facing	Milling ✓	Roughing	Threading				
Cutting Off	Filing	Mounting	Shaping	Turning				
Quantity			Total Time			Rate		
						Cost		

Fig. 19. Time Record Made by the Calculagraph

The machine is made to register either hours and minutes, or hours and tenths of hours. For cost-keeping purposes the latter is preferred for the reason that it is much easier to figure time at a given rate in tenths.

A form of card, without the record, is shown in Fig. 20. The card can be of any size desired, the only requirement being a blank space for the time record in the upper left-hand corner.

As with other recorders, one of these machines should be located at a central point in each department. It is advisable to provide a card rack with compartments bearing the employe's numbers, and to place cards for jobs ahead in these compartments. The cards for the day are first sorted by employes' numbers to verify the clock record, and then by job numbers for the use of the cost department.

		<u>PRESS ROOM</u>	
		Press No. _____	
		Date _____	
TIME EMPLOYED		COMMENCED	
Makeready _____	Slipsheeting _____	Job Ticket No. _____	
Running _____	Bronzing _____	Name of Job _____	
Registering _____	Proving _____	Color of Ink _____	
Changes _____	Holding Press _____	Nature of Form _____	
Corrections _____	Washup and Oiling _____	IMPRESSIONS _____	
Delay for _____	Cutting _____		
PRESSMAN'S NAME _____	FEEDER'S NAME _____		

Fig. 20. Time Card Used with the Calculagraph

Another elapsed time recorder, which was placed on the market after the above was put in type, but before this book went to press, is shown in Fig. 21, the form of record being shown in Fig. 22.

The device is operated electrically, the impulses being furnished by a master clock. This may be located anywhere in the building, preferably in the office, as it will be less affected by vibration and dust. To the master clock is also fitted the 24-hour elimination or cut-out wheel described later. This clock transmits electric impulses each minute all through the building to the various elapsed time mechanisms. Thus all the machines are exactly the same time and cards may be registered in on one machine and out on any other and correct results obtained.

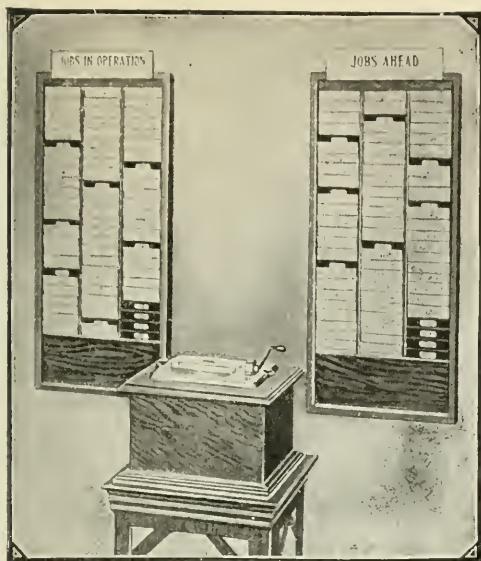


Fig. 21. Elapsed Time Recorder with Master Clock.
Manufactured by International Time Recording Co.

indicating wheels showing exactly the time of day. There is only one handle to be operated and, therefore, no confusion can occur in the mind of the operator as to which handle to pull.

The cards used in the machine may be of any length desired but can only be of one width, $4\frac{1}{4}$ inches. In registering in, the card is placed in the front or starting slot, and the lever pulled over. This prints the starting time at the top of the card in the space to the left. At the same time four small holes are punched in the card which individualize the record. After a job is completed the card is placed in the rear or stopping slot,

The mechanism is about nine inches square and is enclosed in a dust proof iron case. It may be placed on a work bench, on a pedestal, or it may be sunk flush with the top of the bench or desk. The flat cover has two openings or slots for the insertion of the cards. One opening is marked "in" for the first record of a job, the other "out" for registering when the job is completed. There is also an aperture in the cover through which may be seen a series of indi-

IN	OUT	Elapsed Time
AM 7 56	PM 3 11	6 hrs. 15 M.
Shop Order No. 17632		
Operation Milling		
Article No. 301 C		
Lot No. 6		
No. of Pieces 50		
Employee No. 273		
Date Feb. 21-09		
Time 6 hrs. 15 min.		
Rate 20¢		
Cost \$1.25		

Fig. 22. Time Card Used with the International Elapsed Time Recorder

the lever pulled over once more, and the stopping time and actual elapsed time are both printed on the card by one pull of the handle, thus enabling anyone to compare the two records and prove the accuracy of the machine for every record.

One of the salient features connected with this device is its ability to compute only the actual time worked in the factory irrespective of the times of registration. That is to say, in a factory working ten hours a day from seven to twelve and one to six the elapsed time will only be computed during these hours. Any registrations made before seven o'clock will not begin to count elapsed time until that hour, and the computation of elapsed time automatically stops at noon to be resumed at exactly one o'clock, and then continues until quitting time at night, when again it stops automatically. The clock movement, however, does not stop, but always shows the correct time exactly the same as the master clock, and is entirely unaffected by the elimination of the non-working hours in figuring the elapsed time. The machine can also be set to record overtime at night if so desired.

In case work on a given job is not completed on the day it is begun, it is not necessary to ring out on the elapsed time machine until the job is completed as the machine computes up to 100 hours. A job beginning on Monday and running through the week until Saturday night, when it is finished, may be registered on one card, or even for a longer period up to 100 hours.

The elimination or cut-out wheel referred to as being a part of the master clock, is responsible for this wonderful piece of work. The wheel makes one revolution in twenty-four hours and is graduated in fifteen minute divisions for the purpose of setting the contact breakers. The contact breakers are bits of hard rubber which are fastened around the rim of the wheel, and may be moved about at the will of the custodian of the apparatus by simply loosening the set screw. These blocks are set on the starting and stopping time and when they pass the contact breakers the electrical circuit is broken, and the computing device started or stopped as the case may be.

15. Cumulative Time Records. In some factories and shops, the work is of such nature that economy results if the work order and the time record follows the job through all of the operations. For example, hosiery and underwear go through the factory in dozen lots; in a shoe factory a lot of shoes is kept together until every opera-

Time Employed _____ Started _____		Job No. _____
		Operation No. _____
		Man's No. _____
		Number Pieces _____
Time Employed _____ Started _____		Job No. _____
		Operation No. _____
		Man's No. _____
		Number Pieces _____
Time Employed _____ Started _____		Job No. _____
		Operation No. _____
		Man's No. _____
		Number Pieces _____
Time Employed _____ Started _____		Job No. _____
		Operation No. _____
		Man's No. _____
		Number Pieces _____
Time Employed _____ Started _____		Job No. _____
		Operation No. _____
		Man's No. _____
		Number Pieces _____
Time Employed _____ Started _____		Date _____
Make the Following		
Foreman _____		

Fig. 23. Calculagraph Time Card with Coupons

tion is finished; in a harness factory, a bridle goes through all operations on one work order; in a machine shop, one or more rough castings may pass through several operations in the process of converting them into finished parts.

When these conditions exist, it is practical to attach a time card to the work, and to accumulate the time of all employes for the entire job. At the same time, individual time records are obtained.

A form to be used with the mechanical time recorder, Fig. 18, is shown in Fig. 23. This form consists of the usual work order

Order No. _____										Date _____										
Style No. _____										Number Required _____										
Man No.				Operation No.				Order No.				Date								
7	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	8	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	9	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	10	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	11	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	12
1	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	2	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	3	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	4	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	5	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	6
Man No.				Operation No.				Order No.				Date								
7	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	8	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	9	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	10	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	11	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	12
1	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	2	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	3	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	4	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	5	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	6
Man No.				Operation No.				Order No.				Date								
7	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	8	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	9	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	10	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	11	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	12
1	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	2	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	3	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	4	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	5	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	6
Man No.				Operation No.				Order No.				Date								
7	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	8	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	9	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	10	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	11	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	12
1	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	2	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	3	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	4	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	5	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	6
Man No.				Operation No.				Order No.				Date								

Fig. 24. Cumulative Job Time Card

to which is attached a series of coupons, perforated for easy removal. Each coupon is of the right size to accommodate the time record, and particulars as to the order number, operation number, man's number, and number of pieces.

The man who has the first operation enters his number and records his starting time on the first coupon. When the operation is finished, the time employed is recorded, the coupon is detached, and the job goes forward to the next operator. If the operation is not finished at the close of the day, the time record is made and the next coupon used by the same operator.

Each day, all of the detached coupons are sent to the cost department, where they serve several purposes. They are first sorted by employes' numbers, to compare the time reported with the clock

SIZE _____

STYLE _____

LOT NO. _____

SPECIFICATIONS _____

1st.Cutter _____

2nd.Cutter _____

Shoulders _____

1st.Crochet _____

2nd.Crochet _____

Edging _____

Facer _____

Button Hole _____

Buttons _____

Sleeves _____

Cro.Sleeves _____

Fastening _____

Seams _____

Covering Seams _____

Marking _____

Buttoning _____

Tape _____

Fig. 25. Operations Tag Used in an Underwear Mill

record; then sorted by job numbers, to obtain time records for each job. From the coupons, all necessary information is obtained for a record of jobs in process, showing just where each job is at all times.

Another form for a cumulative, as well as an individual time record, is shown in Fig. 24. This card is for use where no time recorders are provided. Each employe records his time, and, when the last operation is finished, the card goes to the cost department. If desired, this card might be made with detachable coupons for the different operations.

PIECE=WORK RECORDS

16. Where piece-rate or premium wage systems are in effect, is it necessary to have accurate records of production, since the pay of the worker is governed by the number of units of production.

[illegible]

Fig. 26. Weekly Time Records for Piece Workers

It has already been stated, that to obtain the exact cost per unit of production, time records must be kept on piece work. It is not, however, absolutely necessary that the time be recorded for each separate job or unit of production. The necessary requirement is that the production records shall be so kept that they can be checked as to time—that the time required for a given number of units of pro-

<div style="display: flex; justify-content: space-between; align-items: center;"> ○ PIECE WORK ASSEMBLING TYPE-A-CAN ○ </div>					
Order No _____		No Cans Ordered _____			
Style _____		Size _____			
Hour Started _____		Date _____		190 _____	
Hour Finished _____		Date _____		190 _____	
Rate per Schedule _____		No Packed _____			
NAME		RATE	AMOUNT	TOTAL	REMARKS
	_____ M	@ _____			
	_____ M	@ _____			
	_____ M	@ _____			
	_____ M	@ _____			
	_____ M	@ _____			
	_____ M	@ _____			
	_____ M	@ _____			
<i>I hereby certify that the above account is correct.</i>					
Date _____					

Fig. 27. Production Record of a Gang of Piece Workers

duction can be obtained, or that the units of production during a stated time can be definitely known.

Piece rates are applied to many distinct classes of work, each of which necessitates a slightly different system of records. One of the industries in which piece rates are largely used, is the manufacture of garments of different classes. In this industry, each garment or lot of garments passes through several operations, each operation being performed by a different operator. Since practically all operations are on a piece-rate basis, it is necessary to obtain a record of the name or number of each operator.

as needed—always writing her name on the tag. When the work is received in the storeroom, a clerk records the last operation on the operator's time card, Fig. 26. One of these cards is used for each operator and accommodates the record of work for an entire week. Provision is made in the column at the left for a record of the kind of work, while the record of dozens finished each day is shown in the proper daily columns. At the end of the week, when extensions have been made, this card shows the amount of wages due, the dif-

[illegible]

Fig. 32. Sheet for a Record of Total Time

ferent kinds of work done, and the quantities finished. In connection with this, the usual clock record of total time is kept, and a comparison of the piece work and clock records will show whether or not the operator is maintaining standard time on the different classes of work.

In the manufacture of certain classes of cans, some of the operations are paid for on a piece-rate basis; but payment is made on the basis of the production of a crew. The operation of crimping tin ends on certain cans, requires a crimper and several helpers, the

latter preparing the cans for the operation. For this operation, the pay of all members of the crew is based on the number of cans finished; that is, if the number finished by a crew consisting of one crimper and four helpers is 2,000, the crimper will be paid for that number, while the helpers will each be paid for 500. The form used for a record of production on this operation is shown in Fig. 27. This is the assembled record, the individual time records being made mechanically on a card, Fig. 28.

On the operation above referred to, the speed of the helpers is limited to the speed of the machine, but if three helpers instead of four can do the work, the pay of each will be increased correspondingly. In the operations handled by crews, there is nothing to limit production. The result is that each member of the crew is obliged to maintain the pace set by the most speedy member, which reduces the cost of production and enables all members of the crew to earn a higher average wage.

A form of piece-work record, used in a factory where employes are expected to keep their own time, is shown in Fig. 29. This ticket is filled in by the employe, *O. K.'d* by the foreman after inspection of the work, and forwarded to the cost department. All unfinished piece work is reported on the form shown in Fig. 30. This report enables the cost department to determine the actual time of all piece-work operations.

Before piece rates can be established for new work, it is necessary to ascertain the average time required for the different operations. This necessitates a very accurate record of production of employes working on day wage rates, and the record must represent the average rate of production of all employes, rather than the rate maintained by a few of the most skillful. A form used in one factory for such a record is shown in Fig. 31. When new work is started, one of these cards is filled in for each employe assigned to the work, and a record kept of each operation. When the records have been kept for a sufficient length of time to obtain an average, the records of all employes for the same operation are combined and, on the average thus obtained, the piece rates are established.

PAYING EMPLOYES

17. The time records of all employes, no matter how kept, must be assembled for the purpose of making up the pay-roll. Special

forms of time sheets or pay-roll records are designed to meet the requirements of different classes of business. Several such forms are shown in other papers in this series; others are illustrated herein.

A conventional form of time sheet is shown in Fig. 32. The names are grouped on this sheet by departments, and opposite each man's name is his number. The daily time records are kept for a period of one week, then totaled, and the amount of wages extended in the last column.

Fig. 33 shows a form of time sheet intended for a tabulation of both the clock record and job time. The bringing together of the total time records (as shown by the clock) and the production time records (as shown by the job time cards) is of very great importance in connection with any system of cost accounting. One must be checked against the other, for unless all of the time for which the employe is paid is accounted for in the cost records, cost figures will be incorrect.

If the two records do not agree, even though the employe is paid for the time shown by his clock record, the discrepancy should be adjusted. Theoretically, every minute of a man's time should be accounted for by his time cards and, when conditions permit, he should be paid only for the time so accounted for. This rule should not be so rigidly enforced, however, as to encourage a man in padding the time on individual jobs to reconcile the total for the day with his clock record; it is far better to have a few minutes unaccounted for. When a foreman fails to have work ready, he should give the workman an idle or indirect labor card, but the man should be impressed with the fact that accurate records are kept of his time on every job, and that all lost time must be either reported on an indirect labor card or left unreported.

The cost of time shown on indirect labor cards, and of all time unaccounted for, should be charged to the department under some such caption as *Department Waste*, never to the specific jobs on which the man has worked. Time wasted between jobs or on account of a breakdown or other unusual occurrence does not affect the legitimate time in which a particular job should be done. It is rather a legitimate charge against the efficiency of the department, and the aggregate of all such inefficiency charges should be applied as an added burden to all of the jobs in the department during the month.

Costs obtained, after adding this inefficiency burden, may be considered the actual costs for the month, but cannot be safely used as standard. Standard costs are the costs obtained under perfect conditions—when the department, shop, or plant is running full time at full capacity; when all of the time of every employe is accounted for by his job time cards; when there is no wasted time or unusual expense. While standard costs may not be attained—probably never will be—this should be the goal, to reach which, managers, engineers, superintendents, foremen, and workmen should strive constantly. As a matter of record, therefore, to show what obstacles must be overcome before the ideal is reached, the inefficiency burden should be added as a separate item after all other items of cost have been computed.

As an example of the effect of the application of this principle of considering efficiency in figuring costs, we will consider an imaginary case. We will suppose that, in a certain month, the pay-roll for direct or productive labor in our shop is \$4,000; that 40 completed machines—identical in every respect—are produced; that every minute of the time of every productive employe is accounted for by his productive job cards. This gives a labor cost of \$100 per machine. During the next month the same men are employed at the same cost—\$4,000—but owing to an unusual breakdown, $2\frac{1}{2}\%$ of the time of these men is wasted; they are idle while the breakdown is repaired, and but 39 machines are produced.

If the \$4,000 wages paid is charged as direct or productive labor, it gives a cost of \$102.56 each—an increase in cost with nothing in the figures that shows the cause. If, however, an inefficiency charge of \$100 ($2\frac{1}{2}\%$ of \$4,000) or \$2.56 per machine is added as a separate item, it is seen at once that here is an unusual item of expense. The amount (\$2.56 per machine) is included in the final costs, but in the right place; there is no cause for confusion on account of an apparent, but not real, increase in the productive labor cost. If the cost of \$100 per machine obtained during the preceding month is standard for productive labor, it still is the attainable standard; the fact of an unusual expense has in no way affected the legitimate cost of productive labor.

Another great advantage in presenting the labor cost statistics in this manner is that inefficiencies are shown in an understandable

form. The fact that indirect labor is increased, say 2%, might occasion no comment; but if an inefficiency charge of even 1% is shown, it calls for immediate investigation.

The establishment of standard or efficiency labor costs means pre-determined costs. This is a radical departure from established custom; on its face, contrary to recognized accounting practice; in results, wonderfully efficient. To determine standards in men, material, and machines is a function of the engineer; the recording of facts—the actual cost—is the function of the comptroller or account-

APPLICATION CARD		
Position applied for_____		
Name_____		
Address_____		
Age_____ Married_____ Single_____		
Habits_____		
Ability_____		
Formerly With_____		
Reference_____		

Fig. 34. Record Card for Applicants for Employment

ant. The two must work together. Properly prepared accounts, showing actual costs with the items that make them segregated, show the engineer how far short of possible standards the plant is running—the extent of the inefficiency.

RECORDS OF EMPLOYES

18. In connection with the different time records designed to record hours of service and units of production, there should be a personal record of employes; and the more intimately personal it can be made, the more valuable will the record become.

Napoleon, it has been claimed, could call by name every man in his armies, but, however great value may have been placed on such a memory feat, the manager of the present-day great business organization, who can call by name each of his employes, is an exception.

It is not necessary that he should do so, for, as business is now specialized and departmentized, he needs to know only the results of the labor of

<i>H.H. FRANKLIN MFG. CO.</i> <i>SYRACUSE, N.Y.</i>	
APPLICATION FOR EMPLOYMENT _____	DATE _____ 190 _____
Name _____	
Address _____	
City _____	
Age _____	Married _____
Where last Employed _____	
How long _____	
Reason for Change _____	
Where second last Employed _____	
How long _____	Reason for Change _____
What Trade _____	How long worked at it _____
Union Member _____	What Union _____
References _____	

O.K. _____	

Fig. 35. Card for Record of Applicants

those employees. By this is not meant that he should not take an interest in the personality of his organization; on the contrary, he

Name		Dept.		No.	
Address		Age			
1st. Employed		Rate of Wages			
Nationality		U.S. Citizen			
Married		Trade			
Children		Formerly Worked			
Change of	Date				Quit
Wages	Rate				Cause
Record					

Fig. 36. Card for Record of Employees

should be very much interested, but he can be relieved from burdening his mind with details by means of simple records.

Somewhere in the office there should be as complete a personal record of each employe as is possible to obtain. This record should include applicants, employes, and past employes, and it should be the duty of some person or department to maintain the record. In the smaller establishments, employes' records should be in charge of the chief accountant, office manager, or superintendent; in larger establishments, the employment department will keep these records.

<i>Name</i>		<i>Address</i>				<i>Clock No.</i>	
<i>Department</i>		<i>Reference</i>					
<i>Age When Employed</i>		<i>Married</i>		<i>Character</i>		<i>Bond furnished</i>	
<i>Date Emp.</i>	<i>Rate</i>	<i>Date</i>	<i>Increase to</i>	<i>Date</i>	<i>Increase to</i>	<i>Date</i>	<i>Increase to</i>
	<i>Hr. Wk. Mo.</i>		<i>Hr. Wk. Mo.</i>		<i>Hr. Wk. Mo.</i>		<i>Hr. Wk. Mo.</i>
<i>Reason</i>		<i>Reason</i>		<i>Reason</i>		<i>Reason</i>	
<i>By</i>		<i>By</i>		<i>By</i>		<i>By</i>	
<i>Date</i>	<i>Increase to</i>	<i>Date</i>	<i>Increase to</i>	<i>Date</i>	<i>Increase to</i>	<i>Date</i>	<i>Increase to</i>
	<i>Hr. Wk. Mo.</i>		<i>Hr. Wk. Mo.</i>		<i>Hr. Wk. Mo.</i>		<i>Hr. Wk. Mo.</i>
<i>Reason</i>		<i>Reason</i>		<i>Reason</i>		<i>Reason</i>	
<i>By</i>		<i>By</i>		<i>By</i>		<i>By</i>	
<i>Special Agreement</i>							
<i>Date Quit</i>		<i>Reason</i>					
<i>Remarks</i>							

Fig. 37. Card Showing Complete Record of an Employe

19. Application Card. Fig. 34 shows a simple form of application card to be filled out for every applicant who is not hired immediately, but whose application receives favorable consideration. This card is headed with the name of the position applied for, or the trade of the applicant. Following this is the name and address, and such information about the applicant as may be considered of special value.

These cards are filed in a regulation card index drawer and indexed under the trade or position applied for. The index cards are headed with the names of the trades employed, the departments, or such other designations as may be best suited to the business. For instance, one index might be headed *Machinists*. Back of this index the cards of all applicants for positions as machinists will be filed in alphabetical order.

A form of application card which provides for more detailed information along certain lines is shown in Fig. 35. While this card is headed with the name of the employe, it is filed under the trade, as described for Fig. 34.

The value of these application records is apparent. When a man is needed, reference to this file will show who has applied and assist in getting a man quickly.

20. Employee's Card. One form of employe's card is illustrated by Fig. 36. This card is filed as soon as a man is engaged. At the

PAST EMPLOYEE'S CARD					
Name _____					
Address _____					
Formerly worked in what department	Rate Per Hour	Rate Per Day	Rate Per _____		
Reason for leaving _____					
Who employed by after leaving us _____					
Nationality	Age	Habits	Character	Married	Children
Record while with us _____					

Fig. 38. Card Record of a Past Employee

head of the card is the name of the employe, the department to which he is assigned, and his clock number. Following this is the address and other essential information. Space is also provided for a record of changes in wages, including both dates and rates. At the bottom of the card, space is left for notes on the record of the employe, which can be continued on the back of the card. The final record on this card is the date the employe quits, or is discharged, with reasons.

Another form of employe's card is shown in Fig. 37. The special feature of this card is that, for each increase in wages, the reason and name of the person granting the increase is noted.

The cards of present employes are filed alphabetically by name. However, in very large establishments, it is advisable to sub-divide

them by departments and arrange the cards of all employes in the department in alphabetical order. It is seldom necessary to arrange the cards by trades for the reason that the names are, as a rule, so classified on the pay-roll records.

The employe's record proves valuable in many ways. If, for any reason, an employe is away from his work, and it is desired to communicate with him, the address is quickly found; in case of an accident, resulting in injury to the employe, the address is very convenient. Again, when a man is wanted for a position a little above that occupied by the average employe, it is best, if possible, to select a man from the present employes. Whether the position be that of a gang boss, a foreman, or the head of a department, a condensed record of past performance, supplementing the personal observations of his superiors, will be found of considerable assistance in selecting the right man. Many other advantages might be named, but those given should be sufficient to demonstrate the advisability of maintaining these records.

21. Past Employe's Card. In some respects, a record of past employes is as important as the record of applicants and present employes. When more men are needed, it is natural to suppose that past employes, whose services were satisfactory, will be specially desirable. On the contrary, a past employe who has been discharged, or whose work was unsatisfactory, is unlikely to be desirable.

Any record that will show who the past employes are, why they left, and their past record, will therefore be of value. Such a record is provided by the card illustrated in Fig. 38. When an employe leaves, for any reason, one of these cards is filled in and filed alphabetically. At the same time, the employe's card is transferred to another section of the file, and indexed under the name of the department, or the trade or class of employment.

These cards furnish a very complete record of employes, past, present, and future. If the number is small, all can be filed in one drawer, with separate indexes to segregate them into classes. Or a large cabinet, with one or more drawers for each class of records, may be required, but, in any event, the records are complete.

MANUFACTURING ORDERS

22. One of the principles that must be kept in mind when installing a system of any description is that provision must be made

for recording every detail of the work intended to be cared for by the system. While this holds true in respect to the systems in every other department of a business, it is of special importance in the manufacturing branch. Accurate costs are out of the question unless every detail of the operations of the plant is properly recorded.

Experience has shown but one method that will insure accurate records, and that method is to manufacture all goods on definite orders and to charge all work not applied to a specific manufacturing order, to expense or operating accounts. The receipt of an order to manufacture before starting the work, is of the same importance to the superintendent as that the commercial department shall receive an order from the customer before shipping goods.

Few managers will accept verbal orders for the manufacture of expensive goods, without asking for a confirmation in writing. When those orders are transmitted to the manufacturing department, it is just as important that they shall be in writing.

Manufacturing orders are of two classes: general orders to the superintendent to manufacture a certain quantity of goods, and specific orders to shop foremen to do some part of the work. For convenience, these orders will be referred to in this discussion as *Production* orders and *Shop* orders.

23. Production Orders. The production order is the written instructions to the superintendent to manufacture certain goods. It is his authority to secure the necessary material, to employ the required number of men, and to convert that material and labor into the finished product. The production order may call for the manufacture of the quantity of goods of a certain type required to fill one or more customers' orders; the manufacture of a certain quantity of goods to be placed in stock, from which to fill future orders; the conversion of a definite quantity of raw material into finished products; or even the manufacture of an indefinite quantity of raw material into an equally indefinite quantity of the finished product, but within a definite period of time.

Usually the production orders of one factory will be confined to one class, though there are some exceptions. In the first class, we find shops manufacturing special machinery, jobbing foundries, and mills manufacturing underwear and hosiery. In the latter business the goods are sold in advance, from samples, and

only the quantities or particular styles required to fill orders are manufactured.

The second class includes furniture factories, typewriter factories, the manufacture of tools, and numberless similar industries in which a stock of standard goods is manufactured for future sale.

An example of the third class is found in a harness factory. In this business, a certain number of sides of leather are issued to the cutting room to be cut. Since the leather is not uniform in weight or texture, it is not possible to cut an entire side of leather into pieces of the same size, or the same parts of a harness—as lines or traces. The cutter must use his best judgment, so cutting the leather that it will produce the largest possible volume of usable stock, with the least waste. The definite factor is the side of leather which is to be converted into an indefinite quantity of finished, or semi-finished product.

The last class is illustrated in the manufacture of salt. The brine—raw material—is pumped from the wells into storage tanks, from which it is drawn into evaporating pans or grainers. An order may be issued to make what is known as *common fine salt* in three of these evaporators. Evaporating processes are influenced by atmospheric conditions—the same heat will evaporate the brine much more rapidly one day than another. Also, the brine is of different degrees of strength—the same quantity does not always contain the same amount of salt. The only definite factor is time—an indefinite quantity of brine is converted, in a given time, into an indefinite quantity of salt and, it might be added, of an indefinite quality.

When all these conditions are considered, together with the fact that each manufacturer has his individual methods of conducting the business—methods probably different from those of his competitors in the same line—it will be seen that the variety of forms of production orders is almost without number. But the important thing is to have an order of some kind—to provide a record.

If there is one essential feature to be incorporated in the production order, it can be expressed in two words—definite instructions. The order should be made perfectly clear, leaving no room for doubt, as to what is desired. When No. 3 dining-room chairs are wanted, the order should state the fact very clearly, and not read *chairs*, leaving the superintendent to guess the style and size.

The form of the production order need not be complicated; indeed, a simple form will serve the purpose much better, an illustration of which is shown in Fig. 39. The heading of this order shows the number and date, with instructions to the superintendent to carry out the work as specified. The body of the order is blank, providing space for entering such details as may be necessary. The blank at the bottom, which is filled in by the superintendent's clerk, shows the date received, date started, the shop order number, and the date finished.

SHOP ORDER				
SHOP ORDER NO.	PIECE NO.	DRAWING NO.	MATERIAL	TO BE COMPLETED
DATE OF ORDER	PRODUCTION ORDER NO			COMPLETED
QUANTITY	DESCRIPTION			

Execute this order and return to factory office upon completion of the work Charge all material and labor to above shop order number. _____ Supt.

Fig. 41. Subproduction or Shop Order

This form is suitable for almost any kind of business or class of order. The production order should always be made in duplicate, a copy to be kept in the office. The office copy will be used to follow up the manufacturing order.

In many lines of business, goods are manufactured only as required to fill customers' orders. The order to manufacture should, in such cases, be an exact copy of the customer's order as entered. With the modern method of entering all orders in manifold—with a copy for each record required—one blank should be included for the factory, this becoming the production order. A form of this kind is shown in Fig. 40. This is an exact copy of the order as entered, the instructions in the heading taking the place of the name and address of the manufacturer. The particulars include the number,

date received, and date to be shipped. The body of the order contains the necessary instructions; in the column at the extreme left—quantity ordered, quantity shipped, size, and description. This is one of a set of blanks that include the invoice, office copy, cost department copy, and copy for the shipping department.

24. Shop Orders. The shop order is the written instruction of the superintendent to the foreman to do certain work or to manufacture certain articles. The order may call for the manufacture of a certain article complete, or it may be for parts to be later assembled

SHOP ORDER NO	PART NO	DRAWING NO	CARD NO	TOTAL CARDS
DATE OF ORDER	PRODUCTION ORDER NO		WANTED	DELIVERED
QUANTITY	MATERIAL			
To Foreman _____ Department _____ Execute above order and deliver parts to department, returning this order to office. _____ Supt.				

Fig. 42. Shop Order Showing Total Work Cards

into a complete article. Shop orders are as varied in form as production orders.

When a superintendent desires to start work on a stated production order, he lays out the work and issues the necessary shop orders to the foremen of the different departments in which the work is to be done. A shop order is issued for each shop—usually these are exact copies. If work on an order requires work to be done in four shops, the four copies are made on the typewriter, at one writing, by means of carbon paper.

Fig. 41 shows a convenient form of shop order. This form includes the shop order number, piece number, drawing number, material, date to be completed, date of order, production order

number on which the shop order applies, and the date completed. The body of the order is left blank for a description of the work

SHOP ORDER				
DATE _____		PROD. ORDER NO. _____		S.O. NO. _____
DELIVER MATERIAL TO _____				
CHARGE _____				
DESCRIPTION _____				
OPERATIONS FOR _____ SHOP _____				
"	"	_____	"	_____
"	"	_____	"	_____
"	"	_____	"	_____
PATTERN NO. _____		DRAWING NO. _____		
NUMBER OF PIECES _____		NUMBER FINISHED _____		
DELIVERIES _____				

Fig. 43. Shop Order with Name of Shop

and the necessary instructions. Explicit instructions must be given on every shop order—the order should leave nothing for granted.

The special feature of the shop order shown in Fig. 42 is the space for *card number* and *total cards*. When an order is made out,

WORKING ORDER					
SHOP ORDER NO.		PIECE NO.		DRAWING NO.	
DATE OF ORDER		PRODUCTION ORDER NO.			
MATERIAL TO GO TO MACHINE		WORKMAN } NO. _____ NO. _____ NO. _____ NO. _____ NO. _____			
When finished, deliver to _____					

Fig. 14. Shop Order Showing Progress of the Work

as many copies are made as there are shops or departments through which the work must pass. The number of the copies of the order is entered under the heading *total cards*—that is, if the work is to pass through four shops, the figure 4 is entered in the space provided for total cards. The copies are numbered in the order in which the work will be done—that is, the order for the shop that does the first work is given No. 1, the second shop No. 2, etc.

There are two special advantages in having the shop orders numbered. Each foreman knows, when he receives his order, how many operations are ahead of his own and how many follow, and can lay out his work accordingly. It does not always follow, however, that because one foreman receives order No. 3, two other operations must be completed before his own can be started. Each shop order may call for the manufacture of a different part, to be sent to the assembly shop, but if one of these parts is in stock, no order is issued. The foreman receiving order No. 2, when his number naturally would be 3, knows that one of the parts is in stock and that his operation must be hurried accordingly.

The employees in the cost department find the numbering system invaluable, for it enables them to tell how many operations there are on a job; also operations which have been completed. This information is of considerable assistance in tracing orders through the shop.

The shop order shown in Fig. 43 answers the same purpose as the form shown in Fig. 42. Instead of the system of numbering the order copies, the plan of inserting the names of all shops is followed. Following the name of each shop is the name of the operation to be performed. This also enables the shop foreman to so lay out his work that the order can be handled promptly when it reaches his shop.

25. Work Orders. The work order is the written instruction of the foreman to the workman to do certain work. As a rule, this order is made on the production time card, as shown in preceding pages. Sometimes, however, it is unnecessary to give more explicit directions than can be written on a small card, which makes it advisable to issue a special order.

In certain classes of work, also, it is advisable to use one work order for a job which is to pass through the hands of several men.

Such a work order is shown in Fig. 44. This order shows the numbers of the men and machines to which the work is to go. Another class of work for which special orders should be issued is outside repair work—as plumbing, steam fitting, electrical repairs, etc.

26. Standing Orders. Manufacturing is fast developing into a system of producing standard parts to be assembled into complete machines and appliances. Every part that goes into a machine is made from a standard pattern and is interchangeable with the same part in every other machine of the same style made in the same shop. It is no longer necessary to design each machine, and each part required to fill an order—the parts are manufactured in large quantities and carried in stock till needed. An order from a customer may require the manufacture of one special part, the balance consisting of parts to be assembled.

The manufacture of parts as standard units is not an accounting problem, but the accounting department and the manufacturing departments must coöperate in maintaining proper records of the manufacture of those parts. The manufacture of one lot of standard units involves the same operations whenever the same unit is made. Adopting this principle to accounting, it is advisable to establish standards in respect to orders. Whenever the same standard part is needed, the order should be for the same quantity; this, of course, after a standard quantity has been established. When units and quantities have been standardized, order numbers should be made standard—whenever the same work is to be done the *same order number* should be used. If this plan is followed, orders are soon recognized by number—and the order number informs the foreman as to the work required.

Series of order numbers should be assigned for different classes of work. Numbers 1 to 100 might represent regular plant maintenance and repair orders; numbers 101 to 200, plant construction and special repair orders; numbers 201 to 400, the manufacture of special tools; numbers 401 to 1000, the manufacture of parts; numbers 1001 to 1500, assembling or production orders for complete machines. Shop orders can be distinguished by a second series of numbers starting at, say 5000.

Illustrating the above, the superintendent of a typewriter factory might receive order number 1007, meaning that he is to assemble

1000 No. 7 typewriters. His assembling order to the foreman would bear the same number. After the parts have been drawn from the parts storeroom, it may be found that the stock of certain parts is running low. Production orders are issued for parts, No. 417 being the number for frames for No. 7 machine. The shop orders may bear the numbers 5060-*a*, 5060-*b*, and 5060-*c*, *a* being the order for the foundry, *b*, the order for the machine shop, and *c*, the order for the finishing department.

[illegible]

Fig. 45. Manufacturing Order Register, Showing Location of Work in the Shop

As to expense orders and construction orders, it is very necessary that the work to be charged against each order number be clearly specified. When the expenditure involved exceeds a certain amount, or where the work is of a special nature, a special order should be required. Explicit instructions for charging all expense items should be given to each foreman, preferably in printed form—or in typewritten form when the number of foremen is small. Many concerns issue printed instruction books containing the order numbers and specifications, with any rules that may be in force governing the conduct of employees, for general distribution among employees.

RECORDS OF MANUFACTURING ORDERS

27. An essential record in any system of cost or factory accounting, is a record of manufacturing orders. A system of records should

ORDER NO

DESCRIPTION

[illegible][illegible]

Fig. 46. Front and Reverse of Card Showing Total Production and Progress of Orders.

be maintained, which will show the exact number and nature of the orders issued to the shop or factory, and from which it will be possible to locate every order—to determine in what stage each order is, and to estimate closely the date of completion.

Such records are equal in importance to records of material, both raw and partly finished, in store at all times. Without them, it is impossible to obtain authentic information about work in process. Orders are certain to be side-tracked, and it is extremely difficult to estimate, with any degree of accuracy, delivery dates for either new or old orders.

The records should be so complete that it will be literally possible to run the business from the office—without calling foremen from the shops, who must return and investigate the condition of an order before an intelligent answer can be given. The manager who can conduct his business from the office is following modern ideas; he is far-seeing—not lucky—for this condition is the result of carefully made plans to insure records that will show him exactly what he wants to know.

Along the line of running the business from the office, Mr. F. E. Webner, in an article in the *Engineering Magazine*, cites an apt illustration. Two very large corporations with a common line of product were concerned. Each of these in turn was asked verbally by an executive officer of a concern which is a large user of the product, as to what delivery could be made on a stated quantity of goods. One concern used the long-distance telephone to a number of its plants; the other concern consulted records within its office and was able to give a decisive reply within half an hour, and to know just which of its works was best able to turn out the goods. The first concern had a number of superintendents on edge looking up data and could not give a positive answer short of two days.

As in every other department of a business, the expense of maintaining an adequate system of order records in the manufacturing departments is infinitesimal, when compared with the results obtained. A single contract lost for the lack of needed information may mean the loss of a valuable customer, the profit on whose business would pay the cost of an adequate system many times over.

28. Manufacturing Order Register. The form of the manufacturing order register necessarily depends on the nature of the

[illegible]

The following is a report of all transfers of work in progress for this date.

[illegible]

Transfer Clerk

Fig. 47. Daily Report of the Transfer Clerk

[illegible]

The following is a report of all work received and delivered by _____ department today

[illegible]

Foreman

Fig. 48. Foreman's Daily Report of Shop Production

business, the product, and the number of operations or departments through which an order must pass. It need not be complicated—simple forms always are to be preferred—the main thing is that all orders be so recorded as to be readily located.

A simple and convenient form for a register of manufacturing orders is shown in Fig. 45. This should be in loose leaf, a sheet being used for each style or size of machine, part or piece manufactured. If, for instance, a typewriter is made in five styles, five sheets would be used—one for each style. Separate sheets would also be used for each part—as many sheets for each as there are sizes.

The sheets should be indexed under the names of the parts and those in each division arranged in the order of sizes. Supposing type bars to be made in ten sizes—numbers 191 to 200—the sheets would be filed in the order of these numbers. Should the industry be one in which orders are issued to assemble parts into complete machines, the sheets on which assembling orders are recorded should be filed with a separate index, but may be kept in the same binder. It is also advisable to use sheets of a different color for these orders.

The heading of this form, Fig. 45, shows the name of the part, the machine on which it is used, the drawing number, pattern number, and style or part number. Orders to manufacture are entered in the columns at the left of the body of the form, giving the date, order number, quantity ordered, and total ordered to date—that is, if 500 parts are ordered on the 10th and 300 on the 25th, the sum of the two, 800, would be entered in the total column. Following the order record columns are columns for the departments, the form illustrated being designed for a furniture business. Under the heading for each department, a daily record is made of the quantity received, quantity delivered to the next department or to stock, and balance in the department, the latter being in an uncompleted state. This form can be adapted to almost any class of manufacture by a proper arrangement of departmental columns.

In most all industries, it is practical to keep a continuous record of all manufacturing orders; sometimes it is best to keep a record for each order. A form of this class, designed for the use of a machine shop, is shown in Fig. 46. This form shows the progress of a single order through all of the departments. A card is used in this case,

both sides being required to accommodate the number of operations, and they are indexed by order numbers.

29. Tracing the Order. The system of tracing orders through the shop or factory is very important and should be as nearly automatic in operation as possible. There may be many orders which need not necessarily be traced, but a system that will automatically keep the office informed on the progress of *all* orders, will pay for itself in the time saved in tracing a single order without proper records. To attempt to find the exact condition of work in progress without a tracing and recording system, is not alone expensive, but unsatisfactory in results; the degree of accuracy is measured by the ability of foreman to make accurate estimates. Practically, foremen should be best able to estimate the time required to complete a job, but their estimates will be found to vary greatly on similar jobs; time standards are more accurately determined by a comparison of the records of past performances.

When practical—and it has been found practical in many industries—a transfer office should be maintained in the works. This office should be in charge of a transfer clerk, who will record all transfers of work in progress from one department to another. Theoretically, all work should pass the transfer office. In the manufacture of small parts, this can be done without loss of time, provided the transfer office is centrally located. When heavy work is the rule, it is not practical to carry out this plan in detail, but such transfers should be conducted under the supervision of the transfer clerk.

The transfer clerk should maintain records of orders in progress, which will be duplicates of the office records, reporting all transfers to the office on the form shown in Fig. 47. This is a simple report form, giving order numbers, part numbers, quantities, and names of the departments between which transfers are made.

When no transfer clerk is employed, it is necessary to obtain reports, in the same form, from the different foremen. This report should provide for an acknowledgment of the receipt of work, as well as a record of deliveries. The form shown in Fig. 48 gives a double check, since the quantities received must agree with the report of deliveries from the department from which the work was received.

From these reports, the order records are made in the office. In addition to their value in maintaining a record of orders, the tracers and reports are used to advantage in compiling an inventory of work in progress.



FACTORY OVERHEAD AND COST SUMMARIES

EXPENSE DISTRIBUTION

1. In order to obtain a thorough understanding of a subject, and to gain a clear insight into the various questions involved, so that one may understand not only its underlying principle, but also its operation in detail, it is quite essential to know first, *why* a thing is done, and second, *how* to do it. While a general knowledge of a subject is always desirable, and to be commended, it is often found insufficient when put to the test. Special subjects require special consideration and study, especially when the how-to-do-it is involved.

On the subject under consideration this is particularly true, for it seems to be a common confession among those handling factory accounts, that while they know in a general way how their expense accounts should be treated, they seem to be in a maze when it comes to actually doing it. The "knowing how" is the best asset of a good accountant; and in these days when the subject of costs is of vital interest to the manufacturer, the up-to-date accountant has the opportunity to show his value. To make the necessary repairs to a touring car broken down on the country road may take but one dollar's worth of the repairer's actual time, but the "knowing how" may be worth ten dollars to him when rendering his bill, and usually is.

While it is realized that there are differences of opinion among accountants on some of the questions considered in the presentation of this subject, it is the intent of this article to present what is generally conceded by our leading accounting authorities as the best practice in a well-organized, up-to-date, industrial plant, and to so present the subject to the prospective student that he may fully understand and master the "why" and the "how" of this important question in factory accounting.

That the subject may be carefully considered in all its various

phases, it will for convenience be developed under the following general divisions in the order in which they are naturally suggested:

- (1) Basis of Expense Distribution.
- (2) Methods of Expense Distribution.
- (3) Percentage Method Exemplified.

BASIS OF EXPENSE DISTRIBUTION

2. **True Cost—What Is It?** Without trespassing on the general subject of cost accounts, it is quite essential to clearly establish at the very outset what constitutes *true cost*. It would be difficult to conceive of a manufacturer to-day who would simply take the value of wages paid and material used for a cost price, and to this amount add the usual percentage of profit he desires to make on his output, and sell at that price. It would be folly to attempt business on any such basis. No business can be conducted without expense, and yet, in the case just cited, the manufacturer has simply ignored it. Suppose the expense of conducting his business exceeds the percentage he added for profit, what then? He soon finds he has made a serious error in figuring his cost, and the item omitted is the cause of his business losses. His selling price was based on less than the true cost of his product and it is noted he has made no provision, in making up his cost price, for covering the expense of operating his factory, his offices, and general expense, including insurance and taxes. It is apparent then that this matter of *expense* has a very important bearing on the cost, in fact is a part of it, and must be carefully considered in making up the cost records. The factor of expense is frequently found to be greater than the direct labor cost itself, and a successful manufacturer must know how much expense his costs should absorb and how to figure it. The sales from his product must more than pay for the direct cost to manufacture and all the expenses of his factory besides, and if his sales are not sufficient to pay for both there is no profit. This expense, then, is an indirect charge to the cost of production, and must be included in it before the selling price can be established. Many a manufacturer has been ruined by not properly handling his manufacturing expense, and the necessity for its careful consideration cannot be emphasized too strongly.

Mr. Clinton E. Woods, one of our leading authorities in factory

organization and accounting, very clearly states that expense and "overhead" charges must be absorbed into the cost of production as much as labor and material, by which operation expense is really converted into an asset.

True cost includes first, *direct labor*; second, *material*; and third, *expense*. The last item will admit of further sub-division and originates from two different sources: First, the expense of operating the work-shop or factory itself; and second, the general expense of offices and administration.

The cost of production, therefore, resolves itself into the following elements:

Direct labor	\$
Material	
Factory expense	
	<hr/>
Factory cost	
General expense	
	<hr/>
Manufacturing cost	

3. Selling Expense. *Selling expense*, oftentimes spoken of as *commercial expense*, has no bearing on cost price. The correctness of this position is easily shown. Two manufacturers, competitors in the same line of production, both operating up-to-date plants with the finest equipment, may produce at the same cost. The expense necessary to market the product from one factory may be so excessive as to cause one concern to lose business to their competitors who can sell their output at less expense, while the actual cost to manufacture may be identical in both shops. Again, while one manufacturer, who can produce at a low cost but carries a heavy selling expense, may conduct his business at a loss, his next door rival in trade may not be able to manufacture as economically but can sell his product with less expense, and thereby carry on a profitable business. In the two instances cited, the key to the losses of one manufacturer and to the profits of the other is in the expense of selling, and not in the cost of production.

In a large plant with an elaborate, well-organized, and expensive sales division, where the dividing line between the commercial and production expense is clear cut, these two expense accounts should be kept entirely separate; the commercial being charged off to *Loss*

and *Gain* direct, while the latter only should be merged into manufacturing cost.

In a small plant, where the selling division is conducted through the general office at an expense so small as not to affect the cost of administration over what would be necessary for manufacturing purposes only, or where there is difficulty in separating the selling from the manufacturing expense, the two are often combined as general expense and pro-rated as one account into production costs.

Theoretically, selling expense is not a charge to production, but the dividing line between this view and the practical one in most cases is a very fine one, and in the interest of simplification instead of elaboration, the commercial will be treated in this presentation of the subject as a part of the general expense, and will be considered in detail later.

4. Expense Based on Cost Price or Selling Price. Having shown that expense is of necessity an item which must enter into true cost, the question at once arises as to what it is related. Is the amount of expense to be borne by any article of production based on its cost or its selling price? While it is noted that some accountants claim the latter should be the basis for calculation, the consensus of opinion seems decidedly in favor of the cost price as the correct one, and there seems to be good argument for the stand thus taken:

(a) Inasmuch as the selling price cannot be established until the cost price has been ascertained, which is to include the expense, it is apparent that the expense must be calculated from data already in hand; either the direct labor or material cost. The selling price is established after, and contingent on, the cost price, not the reverse.

(b) Again, the selling price may vary according to the demands of trade; different prices to different classes of customers, as well as the wholesale and retail prices for the same article. In either case, the cost price is the same and is not influenced one way or the other by the selling price. The selling price may fluctuate while the cost price remains positive and stationary.

(c) While the selling price is theoretically based on cost, it is often fixed by the trade, or regulated to meet competition regardless of cost, and the expense accounts are found to continue about the same each month whether the selling price is high or low.

(d) In times of depression, or when business is slack, it is

common practice to "mark down" the selling price and increase the amount of sales at a smaller percentage of profit.

(e) It is difficult to see wherein there would be any difference in the expense of manufacturing an article which sells at \$110.00 over what it would be were the price but \$100.00, yet there would be if the selling price were used as a basis.

Other reasons will suggest themselves, but these just referred to are quite sufficient to show that the selling price is too erratic and that expense will be found more reliable when figured at cost price, which method has, therefore, been adopted as the best practice.

5. Expense Based on Cost of Labor or Material. Having decided that expense should be reduced in some manner from the direct cost price rather than the selling price, it is remembered that we still have two items of cost to choose from: The labor cost and that of the material. There are those who maintain that the material cost is the correct starting point for calculations, but there are few manufacturers, if any, who do this.

An attempt has been made to use the combined total of labor cost and material, but this method is hardly worthy of serious consideration. The best practice points almost without argument to the labor cost as the true basis of expense; this is not only the logical conclusion but common sense:

(a) It is easy to see that the elements which go to make up the expense of operating a factory—foremen, sub-foremen, supervision, shop clerks, toolkeepers and grinders, helpers, the up-keep of tools and machines, lighting, etc—are all closely related and largely dependent upon the number of men employed. Reduce the number employed and it will be seen at once that some of the above mentioned items of expense can be cut; less supervision is required and the wear and tear on tools and machinery is also reduced. It is difficult to see wherein any difference in cost of the material used would of itself cause any increase or decrease in the factory expense or even be influenced by it. It is quite contingent on the labor.

(b) That the cost of the material is not a reliable basis for calculating expense can be quite satisfactorily demonstrated. If the cost of an article is, say, labor \$25.00, material \$50.00, with expense to be figured at 50% on material, or \$25.00, it is seen at once that the manufacturing cost would be:

Labor	\$25.00
Material	50.00
Expense	<u>25.00</u>
Cost	\$100.00

Suppose this article were duplicated under the same identical conditions and cost, using only this time material that cost \$60.00. It is a fair proposition that the total cost would be but \$10.00 more than in the first instance, or \$110.00. But if the percentage is added on the material as before, it is found that the expense this time is \$30.00, which would make the cost appear thus:

Labor	\$25.00
Material	60.00
Expense	<u>30.00</u>
Cost	\$115.00

It is now noted that the cost figures \$15.00 more than in the first instance, while we are quite ready to admit it should be but \$10.00, the only difference being in the cost of the material.

6. Conclusions. Having established the fact that the expense is a legitimate charge to the cost of production, we are now quite safe in laying down for our foundation the proposition that expense is contingent on, and should be figured from, the direct labor value of the cost price.

METHODS OF DISTRIBUTION

7. Time is continually bringing improvements; old methods once thought practical and satisfactory are replaced by more efficient ones to meet the exacting conditions of to-day. Examine a *Practical Bookkeeping-Manufacturer's Edition* of thirty or forty years ago and you will probably find nothing on this subject of *expense distribution*, while to-day it is one of the most important and most discussed of any in factory accounting in general, and cost accounting in particular. Since that time different methods of handling expense have been devised, some with more or less merit. It will be the intent of this section to consider at some length three of the most frequently used of these methods, endeavoring to find one which will, in the most equitable manner, distribute into production the operating expense of a factory with the least amount of detail and unnecessary figuring on the part of the accountant; and at the same time prove satisfactory from the manufacturer's standpoint.

8. **The Man-Hour Rate Method.** This method, once quite popular, is now but little used, and it is doubtful if it can be found in operation in many up-to-date plants at the present time. The name of the method suggests its intent, which was to distribute factory expense over the various production job orders according to the amount of time spent by the workmen at an hourly rate. This rate is easily calculated, and was established by dividing the total expense for any period by the total number of hours spent on productive work for the same period, reducing the rate of distribution to so much per hour. If 100 hours of labor were spent on a productive job, the cost of the wages paid the workman for this time was not considered, the expense to be borne by the job being figured at the hourly rate for the 100 hours. It will be seen that this is hardly an equitable arrangement, and to rectify a serious defect in the method, some adjustment must be made:

(a) The inability to fix a standard for the efficiency of the labor lays the man-hour rate open to criticism. Could this be done, this method would in many cases prove a very equitable way of distributing expense. It will, however, be seen at once that as it is, a skilled workman carries no more expense than an apprentice boy, and if both work on a productive job a full week, the expense in either case is the same regardless of the wages paid. This is hardly a fair proposition. Either the apprentice's time must be accepted as standard and the skilled workman considered twice as efficient in work-hours, or *vice versa*. To do this would lead to endless complications, yet the quantity and quality of the output between these two classes of labor should be considered and adjusted in some way so that the injustice done the manufacturing cost may be corrected. But this is not an easy matter to regulate, and means extra work on the part of the cost clerks in recording the time spent on job work and adjusting these inequalities in the labor.

(b) The man-hour rate requires that the hours worked be carefully recorded and totaled, as well as the cost. Many concerns with heavy pay-rolls to be apportioned over a large number of job orders, ignore the footing of the long columns of hours and fractions, and use only the totals of labor cost, which are of course necessary for entry in the commercial books. It is obvious that in doing this an immense amount of clerical labor is saved. The man-hour

method requires that both hours and labor cost should be recorded and totaled—a double operation and duplication of work, which, unless it can be simplified, should be avoided, as it means time and unnecessary expense.

9. Machine-Hour Rate Method. This machine-rate plan of distributing expense was designed to meet the needs of a shop where the product is largely the result of a machine or tool operation, rather than the labor of the mechanic himself. It somewhat resembles the man-hour plan in that the rate of distributing expense is reduced to an hourly rate for the time the machine is working on the job instead of the time of the operator. Each machine is intended to have its own rate.

The method of arriving at the machine rate is easily understood, and reduces itself to the item of depreciation on the original cost price of the machine with its shafting, belting, tools, and installation cost figured at, say, 5%, the power to operate machine at an estimated cost per horse-power, ordinary repairs, divided by the number of hours the machine is estimated to be in operation for the same period; this will give the hourly rate of cost to operate. Some mechanical engineers advocate including in the above cost, interest on the investment at 6%, also insurance and taxes; and by others, the value of the floor space occupied by the machine is also included; but in all these latter points referred to, engineers greatly differ in opinion, and it is generally decided by each manufacturer for himself according to his own ideas.

On the question of the value of machine rates there is probably more argument by mechanical engineers and accountants than on any question in factory accounting; in fact, engineers themselves are very far apart in their opinions and do not seem to agree among themselves. Accountants generally are inclined to take a somewhat different view of the situation from our mechanical friends. While it is admitted there is good argument for both positions, it is to be remembered that we are considering the question of machine rates as a means of distributing the expense account, and it seems to be the prevailing opinion among accountants that as such it is found wanting. While, theoretically, it is undoubtedly the correct solution of the problem, it is more often found in practice to be a case of a "distribution that does not distribute," and for this reason is not used

by the very class of factories and machine works for which it was designed and intended to benefit.

Let us consider in detail a few of the objections that may be raised to the machine-rate method:

(a) It will be noticed there are other expenses in the shop than that of operating the machines and not covered at all by the machine expense. Machine rates are absolutely worthless for bench labor and the assembling room, for these two must also share in carrying the shop burden. Not to do so would be manifestly unfair. It is therefore necessary that a second distribution must be made entirely different in its calculation, to handle this undistributed expense not covered by the machine rates, which means two different operations for the same shop.

This necessitates two different time records to be kept, one card for each machine showing jobs worked on and hours idle, and another time card for the workman. It is easy to appreciate that this double operation greatly increases the clerical work in the shop, besides two sets of entries by the cost clerks, and more detail for all concerned. If a method can be found which requires but one time record to be kept, this double process can be done away with and the duplication of work avoided.

(b) The principal factor in the calculation of the machine rate, in fact, the real key to a successful calculation, is in establishing a standard of work-hours for each machine. It is noted that the higher the standard, the lower will be the rate, and the lower the hours operated, the higher will be the rate; in other words, when the machine is idle in excess of the standard, the rate changes. In some shops where the output is a stable product, always in demand, and the machine in continuous operation, a good estimate may be made, but in most shops a machine is frequently idle on account of "no work" or "laid up" for repairs the same as is its operator. The practice in most shops is such that it is extremely difficult to estimate ahead what the work-hours of a machine will be, and it resolves itself generally into an intelligent guess with two estimators far apart in their estimates, yet a satisfactory distribution requires a standard which will work out in figures close to the actual facts.

Who can successfully estimate ahead for any time the activity of each machine in a large factory? Our factory engineers are at

wide variance on this point. One authority says "full time," 300 days a year, is the proper basis for calculation. It would seem as if this were rather an unusual position to take; it apparently being his belief that the time idle would be offset by the time the machine was operated overtime, or else he expected the machinery once put in motion to neither shut down, nor break down. Either appears to be rather a dangerous assumption on which to base a careful calculation for rate of distribution.

Another engineer says 80% of a full day will be found to be the maximum, and further adds: "It will doubtless fall much below that figure." One naturally asks "How much lower?" There is quite a large field of figures to choose from between an 80% activity and a dead standstill for the machine.

It is quite unnecessary to attempt to demonstrate at length that the work-hour standard may be a very elastic figure, and it is often found that after distribution has been made, the results are very unsatisfactory and the machine rates used have proved "way off."

(c) Again, having settled on the work-hour standard, other adjustments appear necessary to equitably handle the machine rate question. For instance, two machines may be of the same book valuation and in cost of operation practically alike, yet one may be far more efficient than the other and possibly turn out two or three times as much work. This condition is constantly found in different shops, and whether or not the two machines should carry the same rate, and, if not, how this inequality shall be adjusted, forms a very interesting question for discussion.

(d) It is noted that the essentials in the calculation of machine rates are all based on estimates which may or may not prove correct; that positive book figures are lacking; and that the calculations are made on assumptions. One of the best professional opinions noted is that expressed by one of our leading accountants, who, commenting on the question of machine rates, observes that "it begins with estimating and is estimating all the way through." This appears to be rather severe criticism, yet one has but to give the subject careful consideration to note that it quite correctly sums up the situation in a few words.

As previously stated, the machine-rate method is without doubt theoretically correct, but, until the subject has been more thoroughly

elucidated and worked out in all its details to fit shop conditions and furnish a satisfactory means of distributing expense, it is doubtful if it will be used to any great extent. This method certainly requires an elaboration of system and detail, with questionable results, and with many serious objections apparent; it seems pertinent, therefore, to ask the question "Is it worth while; cannot something better be devised?"

10. The Percent Method. A third plan of distribution, commonly referred to as the *percentage method*, differs from the two already outlined, in which the time employed was the basis of operation, in that the rate of distribution is a percentage on the direct labor cost of the product, which is, of course, commensurate with the amount of time expended. In the first division of our subject, it was shown that expense figured on direct labor would prove the most reliable.

This method is based on the principle that the production of each department of a plant should shoulder its own expense, and also a share of the general expense. In other words, the cost of the output from the *Blacksmith Department*, for instance, would be the total productive labor of the department, plus the material used, plus the operating expense of the department, plus its share of the general expense of the whole plant. It is only necessary, then, to establish the relation between the productive labor and the expense, and express the same in a percentage. It is immaterial how many departments or processes there may be in the factory; this relation should be found in each case, based on its own productive labor and expense, each department having its own percentage ascertained from its own actual conditions; no estimating about it. The expense, then, is figured on the labor cost. If, in the *Blacksmith Department* already referred to, it is found that the expense at which the department is operated is one-fourth of its total productive pay-roll for the same period, it is at once apparent that if to the labor cost of every productive job, 25% is added for shop expense, the total of these expense items added will equal the total expense of the department. In other words, the shop expense is split up and added to each job in proportion to the labor expended on it.

The general expense is handled the same way. If the total general expense is found to be one-third of the total productive labor in the plant, it is likewise apparent that, if to the labor of every

productive job, $33\frac{1}{3}\%$ is added to cover general expense, the sum total of these percentage items added will equal the total general expense of the plant.

Following, then, the formula outlined at the opening of our discussion under the heading of *True Cost*, the cost of a job done in the *Blacksmith Department*, on which the direct labor cost was \$100.00, would appear on our records as follows:

Direct labor	\$100.00
Material	50.00
Factory expense at 25%	25.00
	<hr/>
Factory cost	175.00
General expense $33\frac{1}{3}\%$	33.33
	<hr/>
Manufacturing cost	\$208.33

This is the *percentage method*. While it is quite natural in anything of value and merit to look for its imperfections, this method is criticised by some accountants who point to flaws in its logic and method of computation; nevertheless, it stands to-day as the best solution of the vexed question of expense distribution that has yet been devised, for it not only has the approval of our best technical authorities, but that of the practical accountant as well. It commends itself to the intelligent judgment of the manufacturer, who is quick to realize its superiority, and it can be recommended for many reasons:

(a) It is based on actual figures, easily extracted from the regular books of account, and which are a true statement of fact; no guess-work or estimating about it. There is no better way to figure what is to be, than to use results of what can be conclusively demonstrated already has been.

(b) It can be used in any manufacturing plant, or in all the departments of the same plant, thereby insuring uniformity of method, which is always desired. No argument is necessary to convince that two methods in the same factory are undesirable when one can be found that is satisfactory.

(c) It accomplishes its purpose—it distributes. If it is found that factory conditions are changing, the percentages used may also be changed so as to increase the amount of expense distributed, or diminish it, as necessary.

(d) It requires less work for the cost accountant. The man-hour plan requires the hours worked to be recorded and footed in addition to the labor cost. The machine-rate plan requires not

only two different calculations, as already shown, but also necessitates the adding of all the hours worked. The percentage plan requires only the labor cost in money value, and renders the recording and adding of long columns of hours entirely unnecessary, which, as can readily be seen, is an immense saving of labor. In a large plant with an elaborate system of job orders to be handled, the value of the percentage method, in doing away with this double calculation, will be appreciated immediately.

(e) Figuring by percentages can be done rapidly, and in many instances it is but a mental calculation and almost instantaneous. Were hours recorded, the frequent use of fractions would render the process of figuring expense less rapid.

(f) It is an equitable means of distribution, for it is based on the direct labor cost, which is not only the most reliable element of cost to use as a basis, but which is one of the principal factors by which the amount of expense is influenced.

(g) It has the endorsement of our best factory accountants and auditors, and it is noted that where "systems" are being installed by factory organizers to-day, the percentage method is continually being adopted as the most satisfactory, for it brings the best results with the least machinery to operate.

PERCENTAGE METHOD EXEMPLIFIED

11. Before proceeding to show in detail the method to be pursued in arriving at the various percentages to be used in distributing expense by the *percentage method*, it may be well at the outset to clearly understand what constitutes *productive labor* and *expense*, or *non-productive labor*, for it is on the former that all calculations are based.

12. **Productive Labor.** The wages paid to the workmen for labor spent on productive work which is offered by the manufacturer for sale, and from which the business derives its regular revenue, is properly classed as *productive labor*. In other words, the amount of productive labor is commensurate with the productive output.

It is frequently asked whether labor spent on plant extensions or new equipment, when made for one's own use, may be considered productive labor and should carry its share of the expense in its distribution. Most assuredly, yes. If this same work were performed

to be sold again in trade it would be considered productive labor and the expense would be added. The reverse is also true; if it were purchased from another manufacturer he would treat it as productive labor, and include expense in his cost and selling price, and the purchaser would have to pay for it, and would carry same in his ledger, in his plant or equipment accounts, and on his balance sheet as an asset. The only difference, if any, is in making new equipment himself, in which case it goes on his books at the cost price to him, thereby saving the manufacturer's profit he would have to pay if he purchased it. Is it, then, any less productive labor because a manufacturer prefers to make his plant extensions or new machinery, himself, instead of buying? It does not appear so; it certainly is productive labor.

13. Non=Productive Labor. All other labor, not distinctly productive as just outlined, must be classed as non-productive. This includes *clerks and offices, foremen, assistants, watchmen, repairs and renewals, small tools*, etc., and all the many expense men not working on product but necessary to keep the plant in repair and operation. Non-productive labor is a question of keeping the factory organization and management up to concert pitch, and is not regulated by the quantity of production.

Inter-department work in a plant often raises an interesting question. Shall labor expended by one department on repairs for another department receive credit for same as productive labor? The foreman of the department often claims that the repairs his men are doing for another department are just as much production, so far as he is concerned, as though his men were building a machine for sale, and should shoulder part of his expense. In a certain sense, all labor is productive, and from a selfish point of view, the foreman's argument is a fair one. But from the broader view of the manufacturer, all such inter-department repairs, or similar work, are a part of the operating expense of the plant, and are necessary for the upkeep of the equipment; they are not made for sale, as is a production order, and must be carried as expense — non-productive labor.

14. Expense and Production Cost Ledgers. Without digressing from our general subject, it may not be out of place at this point to call attention to a most convenient method of keeping cost records. Inasmuch as the cost of production must absorb the expense costs

15. Period for Comparisons. Having shown that our percentages of distribution are based on the relationship of total expenses to total of productive labor, the first step in our calculation is to draw off from our ledgers a statement of each for the same period as a basis for comparison.

Labor

[illegible]

Fig. 1. Private Ledger Labor Account

16. **Pay=Rolls Dissected.** For our first statement, let us examine the pay-rolls and find out what portion may be classed as non-productive labor and what as productive labor, both by departments and in totals, our examination of same to cover a period of six months as just suggested.

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pay-roll of about \$10,000. Ordinarily there will be four pay-rolls each month, but in order to provide for thirteen rolls quarterly, it will be necessary every third month to have the labor account cover five weeks instead of four. Turning to our *Private Ledger*, we find our *labor account* appears as shown in Fig. 1.

It is now seen at a glance that the total pay-roll for six months is \$266,155.00. It is now necessary to know the split-up of the above figures into productive and non-productive labor by departments, and this is easily obtained. By reverting to the pay-sheets, can be found the total pay-rolls for each department during the above period, and from *Ledger No. 1* can be found the portion of these same rolls that were classed as non-productive labor, and the balance will be found entered in *Production Ledger No. 2*, the sum total of which will in each case balance with the totals in the *Private Ledger*. Every dollar of labor is accounted for in either one or the other of the two cost ledgers. Having done this, the labor statement resolves itself into something like the following:

PAY-ROLL DISTRIBUTION

Jan. 1 to June 30, 1908

	Non-Productive Labor	Productive Labor	Total Pay-Roll
Dept. A-Offices	\$9,828|00		\$ 9,828|00
B-Store	2,180|00		2,180|00
C-Power	4,524|00		4,524|00
D-Yard	9,316|00		9,316|00
E	9,971|00	104,409|00	114,380|00
F	7,082|00	31,429|00	38,511|00
G	1,749|00	5,528|00	7,277|00
H	2,488|00	10,659|00	13,147|00
I			
J			
K			
Etc.			
Totals	58,021|79	208,133|21	266,155|00
	21|8%	78|2%	

The above figures are all that are needed so far as the labor end of the comparison is concerned. In fact, the non-productive labor is not necessary and is shown here merely as a matter of interest, as are also the proportionate percentages of each division to the total pay-roll, for it will be remembered that the productive labor is the figure used in all costs on which the expense is calculated.

17. **Departmental Expenses.** Against the amount of productive labor for each department shown in the statement just made, place the total expenses for the same departments. This is readily found by again referring to the *Private Ledger*, where the amount of *Operating Expense, Department E*, for the same months the pay-rolls were tabulated, appears as in Fig. 2. The expenses of all the other departments should be similarly treated.

Operating Expense Department E.									
1908									
Jan.	Pur. Bot. Lab.					3697.33			
Feb.	"					3520.46			
Mar.	"					4000.83			
Apr.	"					3576.01			
May	"					3824.80			
June	"					4111.47			
						22781.00			

Fig. 2. Private Ledger Operating Expense Account

18. **General Expense.** The general expense of a plant, for the sake of convenience as well as information, is kept usually in considerable detail, different ledger accounts being opened to carry the various subdivisions of expense. The use of a *General Expense Account* in the ledger is not recommended, for its very name has the earmarks of a general dumping ground for all miscellaneous items, and is often found a convenient place to hide expense, trusting it will there be lost sight of and thereby escape observation.

The combined total of these various expense accounts is the total general expense, a part of which each productive job is to carry. As they now appear in the ledger as separate accounts, *Executive, Office, Store, Power, Yard, Taxes, Insurance, Printing and Stationery, Telephone and Telegraph, Postage*, etc., it will be seen that each account is in itself but a part of the amount to be distributed, and, to better show this combined total, these individual accounts should be closed out monthly and brought together in another account, called *General Expense Distribution*. This is done by journal entry.

These accounts are now balanced out and combined in total in

Dr.			Cr.	
\$10,293	28	General Expense Distribution		
		Executive Salaries		61,000 00
		Insurance		
		Taxes		
		Depreciation		
		Freight		
		Express		
		Cartage		
		Printing and Stationery		
		Telephone and Telegraph		
		Traveling Expense		
		Postage		
		Legal		
		Water		
		Advertising		
		Etc.		
		Operating Expense Dept. A		
		B		
		C		
		D		
				\$10,293 28

the *Distribution Account*. The *Distribution Account* is now examined to ascertain the total general expense for the same six months previously used, and the *Private Ledger* shows it to be \$67,840 00, Fig. 3.

19. Power. While the cost of operating the power-house is unquestionably a legitimate charge to the operating expense of each department according to quantity used, it is noted that, by the journal entry just made, the cost of same is closed into *General Expense Distribution*.

In a plant operating a central power station with electrically driven machinery, the power used in each shop can be metered and accurately known, in which case, each shop can be charged with the amount actually used. To do this requires considerable extra expense, and although it is done in many works, most plants do not consider the expense worth the results, and are inclined to treat all power as general expense rather than departmental.

In a plant driven by shafting and belting, the power consumed cannot be registered or recorded, and the power required only estimated from tests made as often as desired. Although there may

The percentage columns shown give us what may be considered a very close figure as to what are the actual factory conditions of operating expense and productive labor, and the relationship of the former to the latter. These results are all the more reliable because they are based on actual figures taken from the books of the company, thereby eliminating all estimating and the basing of important calculations on guesses and assumptions, which later generally prove to be far from the real facts in the case. The above results, gathered from six months' operation of the plant, are a fair statement of what the same expenses will be found to be in the long run, although if it is desired to go into the matter still deeper, the same tabulation may be made covering a year, with practically the same results.

What do the above figures show?

(a) That the total operating expenses of the plant are 59.1% of its productive labor, of which amount, 32.6%, is necessary to cover the general expenses, and 26.5%, the average for all shop operations.

(b) That the expense of operating the different productive departments vary according to conditions. That while *Department E's* expense is found to be 21.8% of its productive labor, that for *Department F* is found to be but 17.3%; each department having its own rate based on its own actual figures.

(c) Since, as already shown, each department must shoulder its own expense and its share of the general expense, it is seen from results just shown that for every dollar spent on productive work in *Department E*, 21.8 cents must be added to cover its own operating expense, and 32.6 cents as its share of the general plant expense, and that every dollar spent on production here cost \$1.544. This has been covered in detail under heading, *True Cost*.

21. How to Use Percentages. Let us continue the use of the same figures. It is apparent that, if to the cost of each productive order worked on in *Department E* during the period of six months just considered—all of which is shown in detail in *Production Ledger No. 2*, the sum total of whose labor cost is \$104,409.00—21.8% is added, the amount thus added will be \$22,731.00 (the actual figure is a trifle more), which is just the amount of *Department E's* expense shown in the *Private Ledger* and found in detail in *Expense Ledger No. 1*.

Again, if to the cost of each productive order worked on by any and all departments in the plant during this same period—the sum total of whose labor cost is found to be \$208,133.21 and which is shown in detail by the individual cost sheets in *Production Ledger No. 2*—32.6% is added, the amount thus added will be \$67,840.00 (actual figure is a few dollars more), which is just the amount of total expense shown by the *Distribution Account* in the *Private Ledger*.

It is now a simple proposition. Having found our average ratio of expense to productive labor for each department, and also for general expense covering a period of six months' operations, we can begin to distribute the expenses of succeeding months on the same basis with the same results.

In closing up the *Production Ledger* at the end of each month preparatory to drawing off a monthly summary of all the totals therein to obtain the total cost of production for the month for entry through the journal into the *Private Ledger*, it is simply necessary to enter on each cost-sheet, in columns provided for that particular purpose, two items of expense, one for department expense and one for general expense. In the case of *Department E*, just cited, the expense for the department is to be calculated at 21.8%, and the general expense item at 32.6%.

22. Even Percentages May Be Used. In a large plant with an elaborate system of manufacturing job orders worked on daily with perhaps hundreds of cost-sheets on which an expense calculation must be made, the use of percentages with three figures may require more time in figuring than desirable, in which case an even percentage may be used. Instead of 21.8 for *Department E* use 22, and for general expense, instead of 32.6 use 33. This means that under usual conditions, more expense would be added to production than shown by the expense accounts, and the *Private Ledger* would show whether there had been an over-distribution or an under-distribution in each department's account after the distribution had been made. Turning to *Private Ledger Account, Department E*, while it is shown that, for January, the expense that should have been distributed, if done exactly, would have been \$3,697.33 (had the productive labor for the same month been, say, \$17,095.45), the amount added to production by using 22% would have been \$3,761.00, an over-distribution of \$63.67. To adjust this overdraft in figuring the next month,

use 21%, the idea being to have the ledger accounts as nearly balanced out as possible. Should the general expense rate prove more than sufficient when 33% is used, reduce it or increase it to meet the fluctuations of the expense, with the thought always in mind to keep all balances as small as possible, and to make as nearly a perfect distribution as figures will permit.

It is suggested that where these percentages come close to $16\frac{2}{3}$, 20, 25, $33\frac{1}{3}$, etc., that these figures may be used to advantage. By so doing the expense calculations can be figured mentally and very rapidly, and generally without interfering with a satisfactory distribution. If, however, the overlap each month increases, these should be modified to bring closer results.

23. Journal Entry for Distribution. While it is not the intention in the consideration of this subject of *Expense Distribution* to depart therefrom into the general field of cost accounts and cost records, it is assumed that on whatever form of cost-sheet used, provision will be made for the proper recording of the three elements of cost: labor, material, and expense, the latter in two items. Inasmuch as only totals should be carried into the *Private Ledger*, it is only necessary for drawing off the amounts on the individual sheets in *Production Ledger No. 2* to provide summary sheets with sufficient money columns to accommodate, among other credits, all items for each department's expense and also for general expense. This, when done and totaled, will give the total cost of production for the month, made up of the following items:

- (a) Labor—amount of which should check total of productive labor shown by the dissection of the monthly pay-roll.
- (b) Material—amount of which represents withdrawals from stores during month.
- (c) Departmental Expense—each separate, representing the amount of expense actually distributed and thrown into production.
- (d) General Expense—representing the total amount actually distributed and absorbed by production.

This done, our journal entry will be:

Debit Production.

(This may be subdivided
into as many accounts as
desired.)

Credit Labor.

Material.

Expense Dept.	E
“	F
“	G
“	H
“	I

Gen'l Exp. Distribution.

24. Expense Ledger. The totals from the *Expense Ledger* should also be drawn off in a similar manner, and the same items will appear as those shown in the *Production Ledger*, except that no expense will be added, for it will be remembered that the entries in the *Expense Ledger* constitute the very items which are transferred to the *Production Ledger* through the percentage added.

The journal entry for this ledger will be:

Debit Expense Dept.	A
“	B
“	C
“	D
“	E
“	Etc.

Credit Labor.

Material.

25. Results of Distribution. Having posted the journal, turn again to the *Private Ledger* and note what has taken place. It is found that the two items of labor posted have just balanced out the *Labor Account*, and every dollar of pay-roll has been accounted for somewhere, either into expense or into production. It is also found that all the debits in the shop-expense accounts have originated in *Expense Ledger No. 1*, and the credits have originated in the *Production Ledger*. The various subdivisions of general expense have been consolidated in one *Distribution Account*, which has also been disposed of through the *Production Ledger*. What once appeared as an expense cost has now been wiped out, absorbed by production and converted into an asset, just as Mr. Clinton E. Woods, previously quoted, states it should be. A glance at the trial balance reveals scarcely a trace of expense, the small undistributed balances only remaining.

26. Undistributed Balances. Under any method of distributing expense on a *pro-rata* basis, it is apparent there will be small bal-

ances left, representing either an over-distribution or an under-distribution, as already explained. These may be treated in either one of two ways. If the product manufactured has been practically completed during the year, and but little carried over into the next year to be finished, these balances can be charged off and become a part of the *Loss and Gain* account for the year in which they were created, and the new year begun with a "clean score."

If the product, however, consists of large contract work but partially finished when the year closes, the work on same continuing for some time into the new year, these balances may be also carried over to be worked out in succeeding monthly distributions as the work continues. [When this latter method is chosen, of course it will be necessary that these balances be taken into consideration when preparing the *Balance Sheet*.

27. In Conclusion. While it is realized that the *Percentage Method* is not perfect in all its details, yet it is quite generally admitted to be the best means that has yet been devised for distributing expenses. A manufacturer using it may be assured that his costs thus figured are correctly shown, from the fact that this method is used and recommended by our highest technical authorities in accounting. From the practical side, it appeals to the manufacturer who is more interested in successful manufacturing than he is in the science of accounts, by the simplicity of the method and economy with which it is operated. The same amount of time spent in planning economies and devising means for cheapening the cost of production that is often spent in lengthy attempts at fine figuring, which, when finished, prove unsatisfactory, will be productive of far better results. Any method which eliminates the unnecessary and simplifies the essentials cannot help but prove attractive both to the successful manufacturer and the progressive accountant.

Note: The foregoing explanation of how to distribute the Expense burden in factory cost accounting, may be safely taken as a good exposition of what the author clearly admits (par. 27) is a "rough and ready" method and one which under certain circumstances may be preferable; but, at this time, the more recent studies tend to modify the *modus operandi*.

For example, the latest writers treat not only *factory expenses*—including cost of raw materials used with freight charges, if any, on the materials and perhaps also charges of the purchasing agent and *factory overhead*—but also *selling expenses* as legitimate Costs of Production, the division being into Fac-

tory Costs and Selling Costs. In short, every expenditure necessarily made in securing the required raw material and placing it in the factory (place or possession utility), of shaping it into a saleable commodity (form utility), and of delivering it to the buyer (time and place utilities) are *Costs of Production*.

The so-called "unproductive labor," such as that of the foreman or superintendent, or watchman or janitor, and the expenses, such as, oil or small tools, or light, or heat, are as fundamentally essential to the work of production as the labor of the men who handle the material or the material itself. The term "unproductive labor" is clearly a misnomer and many accountants prefer, on that account, to use the more descriptive term—"indirect labor." The end sought in any case is the total costs necessarily expended in the production of a given article, and if a janitor's services are necessary to the making of the article or a messenger's services necessary to its sale, the payments for such services are *costs* which must be taken into account.

The payments for "productive" or "direct" labor and for materials are clearly costs and are readily assigned as such, but the "indirect" laborers may not even come, in any way, in contact with the article; and the difficulty is so to allocate or to distribute the charge for their services and for the oil, heat, light, rent, and other items as, when added to the charges for "direct" labor and for materials, will give the true cost of production. Sometimes apportionment may be made on the basis of time employed; or, in the case of rent, on the basis of space occupied. But many times such rules are clearly inapplicable and one must apply the various schemes for distribution as the old lady mixed ingredients for baking a cake—with judgment.

The tendency is to allocate, directly, *as much as possible*, and it is seldom, indeed, that labor and materials are the only costs capable of allocation; and, then, for the rest, instead of making distribution upon the basis of a single factor, as the so-called "productive labor," to make distribution rather upon the widest basis; that is, upon the ensemble of all allocated costs; or upon the basis of previous experience; or, better yet, upon estimated costs if so be that the establishment has, in its record of past years or of probable future expenditures, sufficiently reliable data for making such an estimate. This basis of apportionment—the estimated costs—is the distinctive feature in the recent schemes for functional control in industrial and mercantile operations by which attempt is made to anticipate, or to forecast business conditions.

Administrative costs or costs incurred in the government and direction of the plant are also Costs of Production and very properly are so considered; but costs for services of officers who, by reason of their relation to the company, virtually fix their own salaries and choose only between drawing their compensation as salary or as dividend—who, in short, make salary contracts with themselves—have no place either as factor, selling, or administrative costs. Instead, they are to be apportioned as additional and independent items, or taxes, added to the costs of production, and charged against profit and loss. This is recognized by the income tax rulings under which salaries of officers are counted as income either of the corporation or of the individuals to whom they are paid. The government, at any rate, aims to discriminate between real and fictitious costs.

From the total of these—Factory, Selling, Administrative and "other" costs—plus profit, the selling price is to be determined. (Ed.)

OPERATING EXPENSE STATEMENTS

28. It is the business of a bookkeeper or accountant to analyze the detailed records and to present the results in form suitable for the use of his employer, who, by the way, is seldom an accountant and seldom has any liking for statistical data. But he does have a keen appreciation of, and takes a deep interest in, any showing, statistical or otherwise, which shows clearly the conclusions which may be drawn from such data—whether the cash on hand together with prospective cash receipts will cover necessary running expenses and leave sufficient for meeting his trade creditors as their claims fall due; whether his sales on credit are increasing at a more rapid rate than his sales for cash, etc.

The bookkeeper or accountant must remember that the purpose of his report is not to afford him an opportunity to display his own skill, or erudition, but to convey to the reader certain information in an intelligent form; if it does not do this, it might as well not have been written. "What constitutes a good statement?"

29. **Lengthy Statements Undesirable.** That we may have "too much of a good thing," and that even those things worth while may be overdone, is true in the matter of statements. The general tendency seems to be to elaborate rather than simplify, and to crowd into the tabulation a lot of figures representing details which are almost always passed over without examination, or are even hardly looked at. If the same amount of time is spent in studying such a statement that is spent in its preparation, it would not be altogether without value, but the fact remains that it seldom is thus considered.

The size of a company's statement is oftentimes all out of proportion to the size of the business; some of the smaller industries present reports of their operations so voluminous in size as to rival that of the United States Steel Corporation, or that prepared by the actuary of one of the mammoth insurance companies.

It should be remembered that a busy manager is more interested in economical management than in wholesale bookkeeping, and has but little use for a formidable array of figures, except in so far as they show general results. Such a statement, when presented to him, is usually tossed aside to be examined later, while if it were condensed and served up to him in a more attractive form, it would probably

be eagerly examined and studied with interest. A multitude of figures is more apt to confuse than to enlighten the situation, is a waste of an accountant's time, and, being a source of displeasure to the employer, thereby defeats the very object for which it was made.

Detailed records should always be kept, and in such shape as to be immediately available when called for, but it is hardly necessary to incorporate them in a tabulation intended to show results. It will be well, in submitting figures to the manager, to always bear in mind an imaginary notice over his desk: "This is my busy day; be brief." It is safe to say that a good statement should contain as few figures as possible to intelligently show the desired result.

30. Tabulate the Essentials. The data for a good statement should be well chosen. A manufacturer wants results. He is in business for profit making, and wants to know the true condition of his shop operation and the expense, in a concise presentation of facts, and has but little use for comparisons beyond those necessary for showing him the result of his management. He is not often found to be a philanthropist, eager to load down his expense account so that his clerical assistants may use his time to pursue their studies in the science of accounting. He wants to know what his costs of production and the expense of operation are, and where they may be cut, and it is as much to an accountant's interest to show him this in a clear and self-explanatory statement as it is by an elaborate and dazzling array of statistics to show his own ability in handling figures.

A manufacturer will doubtless obtain just as much solid comfort and real pleasure in knowing that special tools recently made have enabled him to clip a few cents off the cost of one of the units of his product, and that economies in his shops have reduced his operating expenses 2% or 3%, as to be furnished the startling information that his *Printing and Stationery* account is .7148% of his *General Expense*, his *Insurance*, 6.2714%, *Postage*, .5218%, *Telephone and Telegraph*, .6538%, and so on down the list.

The illustration used is not an imaginary one either. Statements are occasionally seen wherein all the individual items of expense are thus figured and the percentages carried out four decimal places. Of what conceivable use can such figures be? The only imaginable excuse seems to be that the accountant hoped to lower these percentages in the next period—possibly the third and fourth

figures in the decimal—by bringing pressure to bear on the telephone company and on the insurance underwriters sufficient to get the rates reduced, and by telling the mail boy he must use less postage stamps. Rather a peculiar method of cutting expenses, and it is quite safe to say that the same effort applied in other directions would be productive of far more satisfactory results. A good statement, then, should be clear, concise, and complete.

31. What the Statement Should Show. The two elements in a factory, in which the management is directly interested, are the *productive output* and the *operating expense*. The former should be pushed to the utmost limit, while the latter should be trimmed at every point possible; and it is readily seen that the point of greatest efficiency is reached when the plant is producing at its full capacity. A factory with a complete organization is operated at a heavy expense when running at but 50% of its full capacity. These two elements, output and operating expense, are so closely related that a change in one immediately affects the other, and the relationship between the two, which is expressed in a percentage, is either raised or lowered according to the character of the change.

(a) If the operating expense remains stationary and the production increases, or

(b) If the operating expense is lowered and the production remains unchanged, or

(c) If the output increases at a greater rate than the expense increases, or

(d) If the output decreases at a lower rate than does the expense, then the percentage which expresses the ratio of expense to production is lowered, which means increased operating efficiency and a decrease in the cost of production.

On the other hand:

(a) If the operating expense remains stationary and the production decreases, or

(b) If the operating expenses are on the increase while the production remains unchanged, or

(c) If the operating expenses increase faster than the production increases, or

(d) If the operating expense decreases at a less rate than does the productive output, then these tell-tale percentages automatically increase also, which the manager is quick to note, and mean a falling-off in the economy with which the plant is being operated, for increased expense means increased cost of production.

This means, then, in order to be in complete control of his plant, a manager must have production costs and operating expense well in hand, for these two factors are the keys to successful management. It is up to the accountant to show the manager, in figures, the facts as to the true conditions in the shops, and the statement presented to him monthly must be sufficiently explicit to show him at short notice what the expense of operating each department of his plant has been, and what the items were that made it up.

32. Comparative Figures. It is quite unnecessary to demonstrate the value of comparative statements, for this is generally admitted without argument. They portray at once whether what now is, shows an improvement or a falling short over what has been; in fact the degree of success or failure in any line is gauged by comparison with results previously attained.

A statement showing operating conditions with those of a previous period cannot help being interesting as well as instructive; in fact it is from this source that a manager obtains the information which enables him to size up the changing conditions in his plant, and in case of loss in efficiency, shows him where the remedy should be applied.

If a comparison or test is made between the operating expense and productive output, covering a period of, say, six months or a year for each department or process in the plant, as well as for the general expense, the resulting percentages show what the factory conditions will average in the long run. Any departure or deviation from this average in any succeeding month, as shown by the operating statement, serves to indicate to the manager what he may expect as the results of the present period when actual figures are in hand and actual results known. If a falling off in efficiency is noted, opportunity is offered to make economies before it is too late, and for the balance of the period to make a better showing. While it is true that an extraordinary expense, such as a break-down of machinery, may cause an unfavorable showing for a particular month, it is quite essential that this long run average should be closely followed, in order to show that the previous efficiency has again been maintained, or better still, improved upon.

A comparative statement shows at once any radical departure from normal conditions and accepted standards, and is, in reality,

the manager's barometer of factory operating. The discovery that his operating expenses are increasing without a corresponding increase in the output, means that the storm signals are immediately raised, and there are likely to be squalls ahead in the department responsible for the increase, with an explanation in order from its foreman. The operating statement, then, should show up excessive operating expense, what it is, where it is, and what caused it.

33. Source of Data Used. Having now in mind what characteristics should be embodied in the tabulation, proceed to gather the necessary data for the statements.

Continue the original plan and make the *Operating Expense Statement* consistent with the *Percentage Method*, and extract the data for same from the cost records and books of account in a factory where this method is used.

34. Expense Manufacturing Departments. First prepare the shop operating expense statement for the manufacturing departments. If the cost records have been kept in two binders—one for operating expense in *Expense Ledger No. 1*, and the other for production in *Production Ledger No. 2*—the procedure is simple. The *Private Ledger* account for each department shows the total expense for each month posted in total, with all the details shown in *Expense Ledger No. 1*, to which now refer.

Inasmuch as everything is charged to some job number, both labor and material, it is simply a matter of drawing off the job totals, which will check the department total expense as shown in the *Private Ledger*. A convenient grouping of job numbers will be found of great assistance; say

Jobs 1-99. Standing expense orders.

100-999. Special expense orders.

Generally, *Job 1* is used to cover miscellaneous expense costs not covered by other job numbers, and includes *foremen, sub-foremen, clerks, tool-room men, helpers, watchman, small repairs*, etc., both labor and material. In the matter of repairs, it will be noted that such charges originate from two different sources: those done by the department for itself, and those done for the department by another department, and frequently spoken of as *inter-department* work. By providing two cost-sheets for labor items on *Job 1*, one for direct

labor charges, and the other for inter-department labor, the two items may be easily kept separate.

The material on *Job 1* should also be kept in the same manner. The reason for this is apparent, as it shows up at once how much a foreman is charging to his department himself, and how much is being charged to him by other foremen on inter-department work.

Jobs 2, 3, 4, and so on down the list, can cover the various subdivisions of shop expense, such as new small tools, repairs to tools, repairs to machinery, and as many detailed items as may be considered desirable. If expensive repairs are to be made to one of the large machines, it is desirable to keep a separate cost of same by assigning a special job number for the work, say *Job 100*, rather than throw the cost into one of the standing orders, where it is lost. In fact, a limit of cost should be placed on all new tool-costs, or repairs chargeable to standing orders, so that these jobs may not be used as a dumping ground for extensive repairs, which a foreman may be inclined to conceal from the manager's notice, and for which a special permit should be given by the manager, and job number assigned, before such repairs are begun.

The productive labor of the department will be found in *Production Ledger No. 2*, the total of which, if added to the total of the non-productive labor found in *Expense Ledger No. 1*, will equal the total department pay-roll.

The resulting percentage of expense to productive labor expresses the ratio existing between the two, and is used as the basis for distributing the same expense over the various items of production. The question of distributing expense is only referred to here, having been discussed at length elsewhere. Inasmuch as it will be seen that this percentage will fluctuate somewhat each month, it will be well to show on our statement, the same percentage for the previous month for comparative purposes. The extent of the monthly fluctuation is the key to the situation, for these percentages sum up in one figure the actual results of shop management, toward the lowering of which the best energies of the manager are always directed.

For the sake of illustration, take a plant with a weekly payroll of about \$10,000.00. Having drawn up a form in which the features already discussed have been provided for, extract from the *Expense Ledger* some imaginary figures. The expense accounts

of the different producing departments in the plant will appear as shown in Fig. 4.

After studying the same a moment, what will the manager of the plant discover? Among other things he will see at once:

(a) The total expense of operating each department in the works, with the principal items which go to make it up.

(b) That the total productive labor was 79.9% of the total monthly pay-roll while the non-productive was 20.1%; that the former has been apportioned over the various departments and every dollar of same accounted for.

(c) The ratio of expense to productive labor for each department reduced to a percentage, the average of which for all the productive departments is 25.7%.

(d) From the comparative figures, that the August percentage showed an improvement in operating expenses in most of the productive departments over those for July and that they are a trifle lower than the average for the first six months of the year.

(e) That the operating percentage for *Department F* has jumped up 4.7%, which means that something is wrong in that department, and must be investigated.

(f) That for every dollar spent for productive labor, he must add 56.8 cents to cover operating expenses, of which amount, 25.7 cents covers the expense of operating the shops and 31.1 cents covers the general expense of the plant.

The item of *General Expense* = 31.1% is not derived from any figures that appear in this statement, but is taken from the tabulation covering *General Operating Expense* presented later. It is desirable to have this appear here, as well as the *Department* average percentage, in order to show the total operating expense (56.8%) on the labor, bringing total plant results on one sheet.

35. General Expense Statement. This statement serves as the companion sheet to the one just shown for *Departmental Expense*, every operating expense appearing on either one of these two statements. It is drawn off in just the same manner as the *Departmental* statement, the total of the various expense accounts in the *Private Ledger* and the details of the four expense departments shown in *Expense Ledger No. 1* checking the total *General Expense Distribution* account shown in the *Private Ledger*. It will be seen at once that the *General Expenses* of the plant may be reduced to the following general divisions:

Special Ledger Accounts:

Executive, Insurance, Taxes, Depreciation, Freight, Express, Cartage, Printing and Stationery, Telephone and Telegraph, Traveling, Postage, Legal, etc.

Department A—Offices:	Clerks and supplies.
Department B—Storehouse:	Clerks, laborers, and supplies.
Department C—Power House:	Engineers, firemen, coal, etc.
Department D—Yard:	Laborers, teams, and supplies.
Unclassified Expense:	Not included in above.

The *General Expense Distribution* account referred to originates by closing monthly all the various ledger accounts listed above into one account. This brings all these scattered expense accounts together in one total, necessary not only for the purpose of distribution, but for convenience in ascertaining and handling general expense. The details can be readily taken from the individual accounts before thus closed, while *Departments A, B, C, and D* are carried in detail in the *Expense Ledger*. The total *General Expense* shown then by the statement will check the total shown by the *Distribution* account in the *Private Ledger*.

The form| Fig. 5, will be found a very convenient and satisfactory exhibit. Detailed explanation is quite unnecessary; the tabulation explains itself and needs no assistance. The general conclusion arrived at is that the plant's general expense is found for the month of August to be 31.1% of the productive labor; in other words 31.1 cents must be added to every dollar of productive labor to cover its proportion of the general and administration expense of the plant. The same figures are also shown for comparative purposes for the previous month, and also for the first six months of the year; the manager can see at once exactly how the plant is running.

The same summary figures are placed at the bottom of this statement as were shown on the departmental statement, that each may show the final results of the other.

36. Statements for Foremen. It is often asked whether or not it is a good plan to furnish the foremen of the various departments any cost figures. In a good many shops, it is the rule to *tell them nothing* and to keep them in entire ignorance of their expense costs, the feeling being that in case of an unsatisfactory showing they will be inclined to *doctor* their expense returns by diverting them into production in order to make a more favorable showing.

While it is undoubtedly true that a foreman is frequently tempted to resort to such measures—not a very far-sighted policy to be sure, for it is bound to be shown up later—it would seem advisable to furnish him a copy of his operating expenses not only for his informa-

OPERATING EXPENSE GENERAL			for month of August (4 weeks) 1908	
Special Accounts		Dept. A - Offices		Dept. D - Yard
Canteen salaries		General office		General
Insurance		Treasurer's office		Cheese
Fuel		Purchasing Agents office		Miscellaneous labor
Representatives		Supplies and C&M counters		supplies
Freight		General Foreman and Inspector		Inter-dept charges
Express		Messengers and janitors		
Catage		Light and heat		
Printing and stationery		Painting and stationery		
Telephone and telegraph		Miscellaneous supplies		
Travelling Expenses		Inter-dept charges		
Postage				
Legal				
Water				
Advertising				
Total	4250.00	Total	2500.00	Total
Dept B - Store		Dept C - Power House		Summary
Clerks		Engineers		Special Accounts
Laborers and helpers		Foreman and helpers		Dept. A
Printing and stationery		Coal		" B
Miscellaneous supplies		Miscellaneous supplies		" C
Inter-dept charges		Inter-dept charges		" D
Total	2500.00	Total	1500.00	Unclassified
Dept. D - Yard		Total General Expense		
Divisional Labor 5.50 per = 201.70		Departmental Expense 8.50 per = 257.50		July 20 - 26.50
Productive 22.50 per = 222.70		General 10.50 per = 311.70		" " = 326.70
Total 424.40		Total 1169.20		" " = 521.70

Fig. 5. Tabulation of General Operating Expense

September 15, 1908.

Foreman E Department:

(Via Manager.)

The cost of operating your department for the month of August, 1908, was as follows:

Job 1 Labor charged by your department . . .	\$2,150.50
1 Labor charged on inter-department orders . . .	319.50
1 Material charged by your department . . .	385.25
1 Material charged on inter-department orders . . .	109.75
2 New small tools . . .	325.40
3 Repairs to tools . . .	169.60
4 Repairs to machinery . . .	125.30
100 Repairs to lathe #36 . . .	74.70
101 New tool racks . . .	40.00

Total expense for month \$3,680.00

The Productive Labor of your department was . 17,211.00

Percentage of Total Expense to Productive

Labor, Aug. 21.4

Percentage of Total

Expense to Productive

Labor, July 23.9

Auditor.

Remarks: Manager requests estimate of cost to complete Job 100.

Fig. 6. Statement of Departmental Expense Made to Foremen

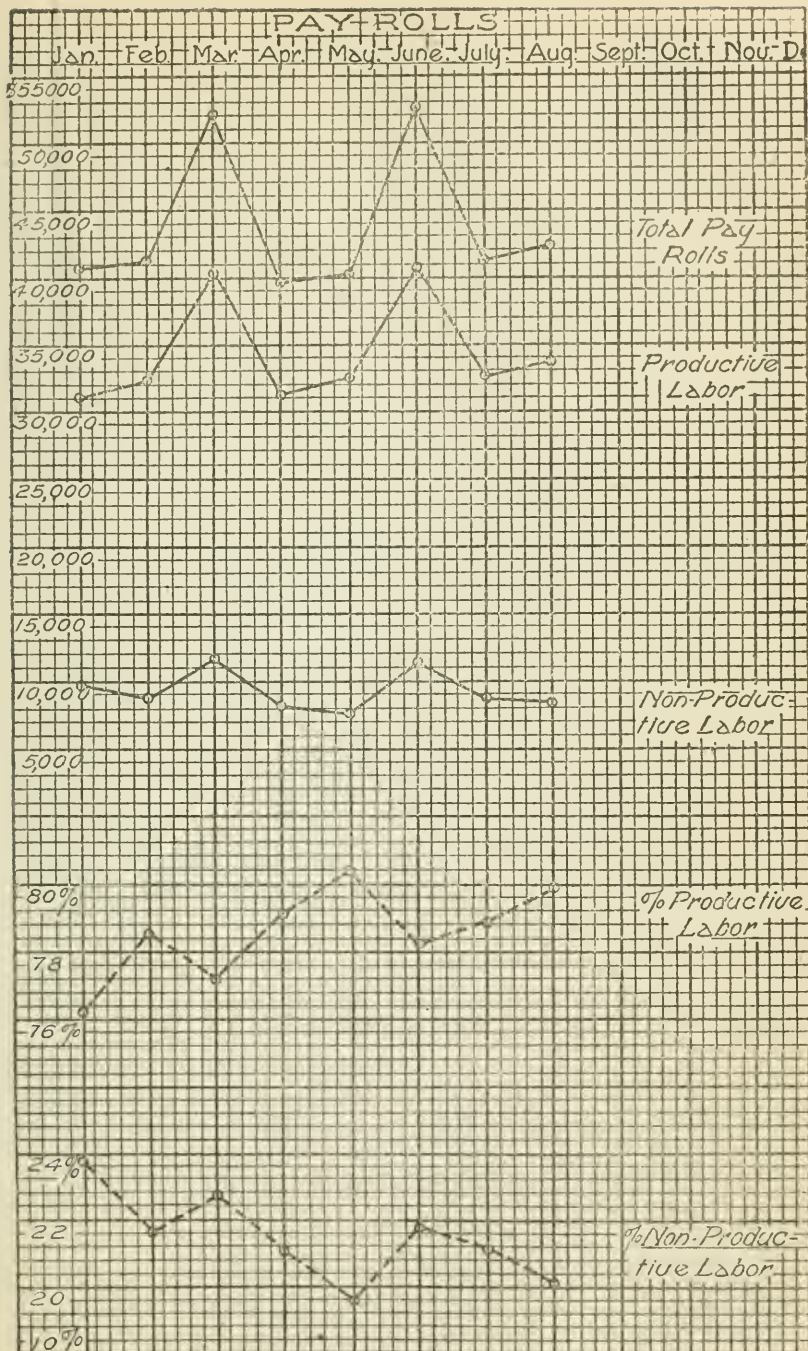


Fig. 7. Graphic Chart Showing Fluctuations in Labor Costs

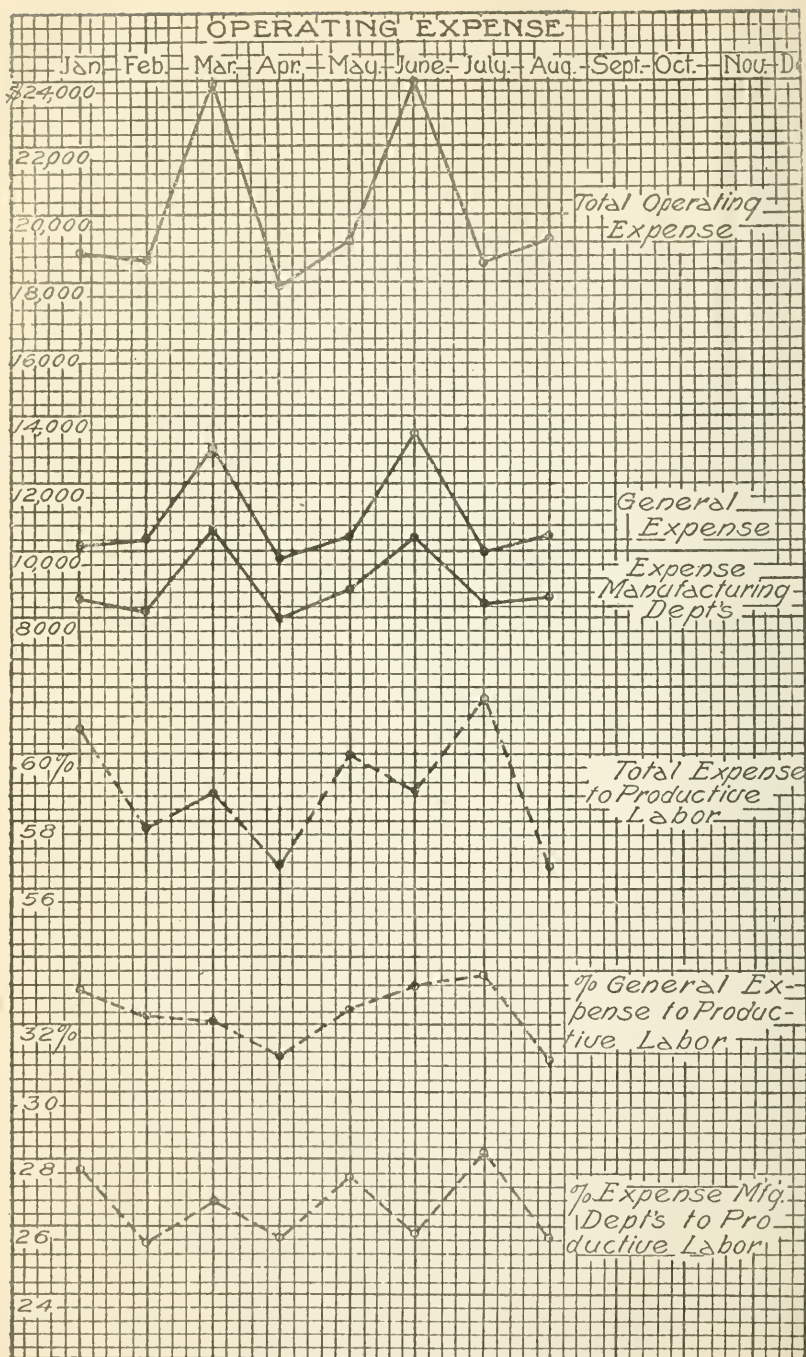


Fig. 8. Graphic Chart Showing Fluctuations in Operating Expense

tion but as an incentive to practice economies on his own initiative without waiting for a *call* from the manager. Most foremen are quick to see that it is for their own interests to do this and to make the best possible showing for their department. It also creates a good-natured rivalry among the various foremen, which tends towards good results in which both foremen and management share.

The statement furnished the foreman is simply a copy of the expense of his department as shown on the *Departmental Expense Statement*, and may be made up substantially as shown on the form herewith presented, Fig. 6.

37. Charts. While the value of chart records is generally admitted, there will probably be no one in the plant who will appreciate this form of presenting figures more than the manager, who, from his mechanical training, will at once grasp the situation as thus presented. The general trend of operations for the whole period is immediately revealed at a mere glance, without any systematic study of the figures involved, and any unusual condition is detected at once.

To show the possibilities of thus arranging comparative statements, two charts, Figs. 7 and 8, are presented, on which are plotted the same results appearing on the tabulated statements already shown, or previously used for the purpose of illustration on Pages 31 and 34.

On one chart is shown the total pay-rolls with split-up of same into productive and non-productive labor, with the percentage of each on the total; the other shows the total expense, also subdivided into shop and general expense, with the resulting percentages of same on the productive labor as shown on the first chart.

38. In Conclusion. While there is no end to the number of statements that can be prepared and that can be elaborated almost indefinitely, it is well continually to bear in mind that the statement which best serves its purpose is the one which is most suited to the needs of the person who is to make deductions from it. The statistician has need to know both his data and his client; one client may reason better from relative data, another may need the absolute. In general, simplicity is most desirable. Essential data, only, should be presented and so tabulated that their meaning is apparent. Then the statements will be both interesting and useful.

COST SUMMARIES

39. The preparation of cost accounting records requires a knowledge of cost accounting principles and methods of collecting and tabulating cost data; but all this will be of little real value unless one understands also the nature and workings of the establishment for which the accounting is to be done.

Any system of cost records is deficient that does not provide for the tabulation of all items entering into the cost of individual units or jobs, in such form as will permit of the computation of total of such costs for comparison with records of total manufacturing expenditures. Three elements enter into the cost of the finished product—*material, labor, and expense*.

Under the head of material is included the cost of materials of all kinds of which the product is made.

Labor is of two classes, *direct* and *indirect*. Direct labor is that which is applied directly to the manufacture of a given article; indirect labor is that which, while necessary to the operation of a shop or factory, is not applied to specific jobs or the production of individual units. In a manufacturing industry operating a machine shop, the labor of machine operators would be classed as *direct*, while the labor of porters, oilers, and general workers employed in the shop would be classed as *indirect*. The superintendent of the plant, shop foreman, factory clerks, engineers, firemen, and general workers also belong in the indirect classification. For accounting purposes, indirect labor is divided into two classes—shop indirect and general indirect. Shop foremen and general workers employed exclusively in the operation of a single shop are properly classified as *shop indirect*, and their wages are charged against the operation of the shop. The superintendent, factory clerks, and general workers necessary to the operation of the plant, whose time cannot be charged against the operation of any one shop or department, are classified as *general indirect*.

Expense includes all items entering into the cost of the product or the operation of the plant, that are not included in the charge for material and labor. Expense, like labor, is properly divided into *shop expense* and *general expense*. General expense includes the cost of all supplies and miscellaneous items of expense incurred in the operation of the plant, which cannot be charged to individual shops.

Such items as heat, light, building maintenance, taxes, insurance, and depreciation belong in the classification of general expense.

Any classification of expense items that is not made with reference to a specific plant, must be general; items that in one plant must be classed as general expense, are applied in others as shop expense. The item of power costs furnishes an example. In a plant equipped according to modern engineering ideas, with electrical transmission of power and each machine equipped with its own motor, an exact distribution of power costs to individual shops is a simple problem. The total cost of power for a month is divided among the several shops in proportion to the amount used by each, as shown by meters. Even the hourly cost of power for each machine can then be determined. With a shaft- and belt-driven plant the problem of distributing power costs is less simple. When power costs can be distributed accurately to departments, however, it should be done; otherwise such departments as the drafting room may be charged for power when none is used.

COLLECTING COST DATA

40. For the purpose of making the necessary summaries, complete details of all items of cost for each operation must be collected. This data supplies the foundation for all tabulations of cost statistics.

The first step necessary to insure a record of the cost of manufacture of a given article is the entering of a production order, followed by the necessary shop orders, and the orders of the foremen to the workers. The details of these orders are fully described in another section.

When a foreman receives a shop order, his first duty is to ascertain what material will be needed. He then orders this material from the store-room, using a requisition as described in the discussion of systems for the stores department.

On receipt of the material the quantity is checked against the foreman's copy of the requisition, which is then sent to the cost department. In the store-room, the necessary entries are made on the stores records, after which the requisition is sent to the cost department.

When the foreman is ready to assign the work, he issues work orders to his men. As explained in the discussion of labor records,

the usual form for work orders is a time-card. On completion of each job, the men deposit the time-cards in the rack provided for that purpose. These are later sent to the cost department.

In actual practice, it is usually best to have all requisitions and time-cards collected once during each day by a messenger from the cost department. Sometimes, the cards are also filled out in the cost department and delivered to the foreman with his shop order, leaving him to enter only the man's number. When this plan is followed, the cost clerk must be familiar with all of the operations required, and must keep the foreman supplied with work orders to keep the shop employed for at least a day ahead.

The receipt of the requisitions and time-cards supplies the cost department with the necessary data for material and direct labor charges to individual jobs. Data for similar charges on account of repairs is secured in the same way.

The character of the records compiled from this data determines the real value of the entire system of cost accounting. If, as is so often the case, the compiling extends no farther than a mere tabulation of costs of individual jobs, it does not reach its full value as a part of the accounting records. Like single-entry bookkeeping, such records are no more than mere memoranda. The full value is reached only when the records of the cost department are made a part of the general accounting system of the business; where controlling accounts absorb all individual items of cost.

41. Material Costs. The compilation of material costs from the requisitions should exhibit the total cost of all material used in the plant and the total cost of material used on each job.

The records intended to exhibit the cost of *all* material issued to the factory should be divided according to classes, following the same classifications as used for material purchase accounts in the general ledger. This is very important as the information secured from such classifications is needed to form the connecting link between the cost and general accounting systems.

The value of the accounting records is greatly enhanced if, in the general ledger, a purchase account is kept for each class of material and supplies. If but one kind of material is used, only one material purchase account is needed, but in a furniture business, for instance, separate accounts should be kept for purchases of lum-

ber and hardware; in a harness manufacturing business, accounts should be kept for harness leather, patent leather, saddle leather, and hardware. The proper classification for any special business will readily suggest itself, but the material should be classified according to its most natural divisions.

The stores records also should be divided according to the same classifications, so that the records of material included in any one purchase account can be checked, without reference to the records of other classes. In the store-room of a harness business, a card or sheet would be used for the record of each item in the hardware stock, while all of these individual records would be filed under the general classification, *hardware*.

This method provides three records, each closely related to the others. In the general ledger, there is a *hardware purchase* account; in the store-room, a detailed record of the hardware stock; in the cost department, a record of all hardware issued to the factory. When the cost department record is brought into the *hardware purchase* account, by a credit through the journal, the balance of this account should show the value of the hardware stock and should agree with the records of the stores department.

The compilation of supplies costs should be made along similar lines, and the same care should be used in the classifications. Fuel purchases, for instance, should be kept in a separate account, while general factory supplies—as oil, belting, waste, etc.—may be kept in one account or subdivided, depending on the size and nature of the business.

42. Material Cost Reports. The material records of the cost department relating to totals issued should be made in the form of reports, as they will be required in the general accounting office. These reports need not show order numbers, but should show whether used on production, construction, or repair work. The supplies record should show by what department the supplies are used.

Fig. 9 shows a form for a report of material costs. In the heading is given the class of material, being the caption of the purchase account in the general ledger, and the month for which the report is made. The body of the report provides for a daily record of amounts charged to production, repairs, and construction, with an extra column for any special classification that may be needed at any time.

This form is in duplicate, the original being printed on light weight paper to insure perfect carbon copies. A loose-leaf form is most satisfactory because both copies, with carbon paper between, can be kept in a binder and the entries made each day.

Duplicate sheets are used for each material classification. Each day, the amounts are extended on all requisitions. The requisitions are then sorted according to material classifications, those applying

Class of Material _____									
Month of _____ 19 ____									
DAY	PRODUCTION AMOUNT		REPAIRS AMOUNT		CONSTRUCTION AMOUNT		AMOUNT		TOTAL
1									
2									
3									
4									
5									
6									
7									
8									
9									
27									
28									
29									
30									
31									
<p><i>The above is a report of Material issued to the Factory as reported by the Stores Clerk:</i></p> <p style="text-align: right;">Cost Department By _____</p>									

Fig. 9. Monthly Statement of Material Issued

to production, repair, and construction orders being kept separate. Those of each subdivision are footed, preferably on an adding machine, and the total is then entered on the report.

For sorting requisitions, a box or rack, with compartments for the divisions in each class, is most convenient. Such a rack is shown in Fig. 10.

Reports of supplies issued to the factory are handled in the same manner as materials. The form used for this purpose and shown in

Fig. 11, is similar to the material report form, the only difference being that amounts are distributed to the several departments.

At the end of each month, the report forms for material and supplies are footed, the original is sent to the general accounting office, and the duplicate is left in the binder in the cost department. When the cost accounting is handled in the general accounting office, it is not necessary to make these reports in duplicate; this is necessary only when the offices are separated.

43. Labor Costs. From the time-cards or work orders, labor costs are compiled both for separate jobs and to show totals by departments and for the entire plant. The compilation showing totals is made for the purpose of checking the pay-roll—to prove that all labor paid for has been charged to factory operations in some form.

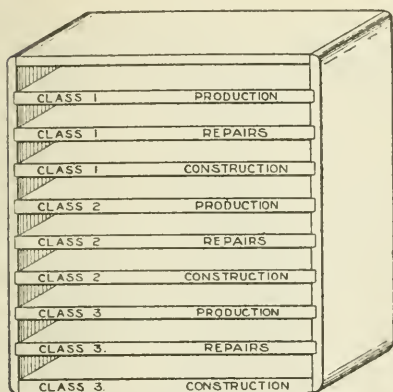


Fig. 10. Rack Used for Sorting Requisitions

The time-cards should first be sorted according to departments, then re-sorted to separate the direct production, indirect production, repair, and construction labor of each department or shop. The cards representing the different classes should be footed on an

adding machine, and the department totals compared with the pay-roll records. Daily comparisons should be the positive rule in order that discrepancies may be adjusted while the matter is fresh. On no account should the adjustment of discrepancies be omitted—labor reports from the factory *must* agree with the pay-roll. Cards showing the class of work done must be turned in for *every* man.

The tabulation of labor costs is really made for the purpose of distribution; that labor charges may be distributed to the proper accounts. The nature of the tabulation will, therefore, depend largely on the class of business for which it is to be used. In some lines, costs must be distributed by both departments and classes of labor; in others, by classes of labor only; sometimes, by classes of product—though this will usually be covered in the departmental distribution.

A form intended for the distribution of labor costs in a single department is shown in Fig. 12. This form is in loose leaf and is filed in a binder, the sheets being arranged in numerical or alphabetical order representing the departments. If the cost and general accounting departments are separated, this form should be in duplicate; otherwise, one copy is sufficient.

In the body of the form, distribution columns are provided for the different classes of labor—direct, indirect, repair, and

Class of Supplies _____								
Month of _____ 19 ____								
DAY	DEPT. A AMOUNT	DEPT. B AMOUNT	DEPT. C AMOUNT	DEPT. D AMOUNT	DEPT. E AMOUNT	DEPT. F AMOUNT	TOTAL	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								

*The above is a report of Material issued to the
Factory as reported by the Stores Clerk*

Cost Department
By _____

Fig. 11. Monthly Statement of Supplies Issued

construction, with a column for any special classification that may be needed.

After comparison with the pay-roll record, the total labor costs are entered daily on this form. At the end of the month, the sheets are footed and originals sent to the general accounting office.

44. Job Costs. When they have served their purpose in compiling total material and labor costs, the material requisitions and time-cards are sorted by job numbers, direct and indirect, repair and

construction cards being kept separate. Where operation costs are desired, the time-cards for direct labor on each order or job number are re-sorted by operation numbers. Totals of material costs for each job, and totals of direct labor costs for each operation and job are obtained, these amounts being the basis on which charges to jobs for the day are made.

The totals of each class, obtained from requisitions and time-cards, must agree with the totals of corresponding classifications on

LABOR DISTRIBUTION											
Department _____											
Month of _____ 19____											
DAY	DIRECT AMOUNT		INDIRECT AMOUNT		REPAIRS AMOUNT		CONSTRUCTION AMOUNT		AMOUNT		TOTAL
1											
2											
3											
4											
5											
6											
7											
8											
26											
27											
28											
29											
30											
31											

The above is a report of the distribution of labor
for the _____ Department:

Cost Department
By _____

Fig. 12. Departmental Labor Distribution Sheet

the monthly tabulation of material and labor costs, as in Figs. 9 and 12. Totals of material and direct labor for jobs and operations are next entered on job or operation records, or both. As a rule, it is best to arrange job records so that material and labor costs can be entered daily, no matter how much time is required to finish the job.

Fig. 13 shows a form designed for the assembling of material and labor costs for a single shop or department. For the labor dis-

tribution, as many columns as necessary are provided for the record of costs by operations. In the material column, the kind of material is entered and the amount extended. When the manufacture requires operations in several shops, one of these forms is used for each shop on each production order—that is, a form for each separate shop order. When the job is finished, the costs for all shops are assembled on one form to obtain the total cost of the job.

[illegible]

Fig. 13. Recapitulation of Departmental Labor and Material Costs

The total material and direct labor costs are brought down on this form, but indirect labor and shop expense are added as a percentage, as has been described in the discussion of expense distribution. General indirect labor and general expense is added to the combined total of all shop costs. In this connection it may be well to emphasize the importance of distributing every expense possible to individual shops, leaving only those items that cannot be so distributed to be added as general expense. For the ostensible purpose

of reducing labor, it is the practice of some accountants to throw all expense items into one class, adding the whole as general expense. This is not to be commended, as it results in an unequal distribution. In one shop, the ratio of indirect labor, or of the cost of supplies, to direct labor, may be much higher than in another; the expense for oil, belt lace, waste, etc., is heavy in the machine shop—nothing in the assembling shop. Adding all expense under one head, means that the same per cent is added to direct labor costs in all shops to cover these items; plainly, an unfair charge.

A further reason for distributing expense to shops is, that costs of separate operations are more accurately figured. To reach their greatest value, cost records should reduce costs to the smallest possible unit. Every detail should be shown, and these records should be available for comparison.

Fig. 14 shows how the Boston ledger may be used for a continuous cost record. The regular form is used, five lines being set aside for each job. The first line is for the job number, following which, material, direct labor, indirect labor, and expense are entered. Under each date, the first column contains particulars of previous costs, the second, the costs added for the day, and the third column contains the totals to date. It is not necessary to use the column for previous costs except the first day for which the page is used; daily costs can be added to totals for the previous day.

Several jobs can be recorded on one page and the record can continue until a job is finished. Additions can be made daily, weekly, or even monthly. This form is used to excellent advantage for contracts that cover a long period.

When a large number of small jobs are going through the factory at all times, the labor of the cost department can be reduced and, as a rule, satisfactory results secured, if tabulations of job costs are made when the job is finished. This should not be allowed to interfere with the daily tabulation of total costs, but when requisitions and time-cards have been re-sorted by job numbers, they may be filed by these numbers, in a job rack—new cards being added from day to day until the job is finished. Tabulations can then be made of material costs, showing the quantity and cost of each kind used, and of the labor costs, showing costs by operations or by order numbers.

Each business requires its special form for job cost records. The

form must provide for the information of greatest importance to the business in which it is used. The forms shown herein are submitted as examples for their suggestive value.

Fig. 15 shows a form adapted to many lines. This form is intended for a record of the cost of parts, but could be used for assembled machine costs. Provision is made for detailed labor costs by man, numbers, and kind of work. It will be noted that, after obtaining the actual manufacturing cost—material, labor, and fac-

[illegible]

Fig. 15. Recapitulation of Costs for a Single Job

tory burden—profits are added. In our opinion, profits have no place in cost records. To establish a selling price, it is legitimate to add a factory or manufacturing profit before adding a percentage to cover sales expense and a selling profit, but the addition of these percentages has no bearing on the actual manufacturing cost.

Fig. 16 is a representative form for a machine shop. All operations and materials are listed by name, totals only being recorded. Factory expense is added to the labor cost, while a percentage to

cover loss and waste is added to material costs. This form is subject to the criticism that all expense is added as one item—no provision is made for segregating the expense of each shop.

The form shown in Fig. 17 is adapted to a small shop, or for repair jobs. This is the most simple form that could be devised; columns are provided for all essential information, and all items are to be written in.

Name _____						No. _____					
SIZE						WEIGHT					
OPERATION	HRS.	COST		OPERATION	HRS.	COST		MATERIAL		AMOUNT	
Molding								Cast Iron			
Cores				Tap-Thread				Malleable Iron			
Grind								Bar Steel			
Turn				Whittle				C.R. Steel			
Drill				Bore				Sheet Steel			
Face				Mark				Angle Steel			
Punch				Rip				Spring Steel			
Bore								Ref. Iron			
Keyseat								Lumber			
Fitting				Dip				Paint			
Build				Paint							
Forge				Stripe							
Bulldozer								Loss and Waste %			
Drop				Assembling				Total Cost of Material			
Trip				Labor Cost				Total Cost of Labor			
				Factory Expense				Total Cost of 100 Pieces			

Fig. 16. Cost Summary for Use of a Machine Shop

45. Comparative Cost Records. The chief value of cost statistics lies in the opportunity offered for comparison. The fact that the last lot of part No. 10 cost \$1.17 each, does not, of itself, indicate that the cost is either low or excessive; but if our records show that two previous lots have cost \$1.20 and \$1.21 each, the comparison reveals the fact that the cost is low.

Valuable as this comparison is, it would be still more valuable if it showed *why* the cost is less. Suppose labor and material costs are segregated. Comparison shows that the reduction of three cents

is made up of one cent material and two cents labor. Now if the quantity and cost of each kind of material used, and the time and cost of each operation are segregated, an analysis will show the exact operations on which the saving has been made. It will be found, perhaps, that the cost of operation No. 10 was actually decreased three cents, but that the cost of No. 16 increased one cent. Why these variations? Was some unusually favorable condition responsible for the saving on No. 10, or can the new cost be maintained?

Job No. Their Order No. Date Ordered							
MAN'S NO.	HOURS ON JOB	RATE PER HOUR			MATERIAL		
Total Hours		Shop Burden					
Cost of Material							
Total Cost					Total Cost of Material		

Fig. 17. Cost Summary for Small Shops and Repair Jobs

Can the cost of No. 16 be brought back to the former figure?—these are the questions to be answered by the production engineer. The records of the accountant supply him with the means of comparison—point out both saving and waste. Profiting by the information, the engineer devises ways of approaching more closely to maximum standards of efficiency.

Comparative records should, therefore, provide for a comparison of every item entering into manufacturing cost. Comparisons

should be based on standard units; if two jobs are to be compared, they must be identical or the comparison is of no particular value. The modern method of manufacturing standard parts makes comparison of practical value. Savings and wastes are more readily located in the manufacture of parts, than in building a complete machine.

Excellent examples of comparative records are shown in Figs. 18 and 19. Fig. 18 provides a detailed comparative record of labor

ITEM										S.O.					
	MAT'L	LABOR	19 ____	MAT'L	LABOR	19 ____	MAT'L	LABOR	19 ____	MAT'L	LABOR	19 ____	MAT'L	LABOR	19 ____
April															
May															
June															
July															
August															
September															
October															
November															
December															
January															
February															
March															

Fig. 20. Monthly Comparison of Costs of Standing or Expense Orders

costs, the costs of seven jobs being recorded on each sheet. This shows, for each operation, the number of pieces, hours, amount, average labor cost, and average time consumed. If on three orders, 2,000, 3,000 and 5,000 parts are made, this record will show the total cost of each order, the cost of each part, and by comparison, the relative cost when manufactured in different quantities.

To provide for an analysis of material costs, the form shown in Fig. 19 is used. This is similar to the form shown in Fig. 18, the

difference being that it shows detailed costs of each separate kind of material. Fig. 19 is printed on the reverse of Fig. 18. The form is loose leaf and the sheets are filed in a binder in the order of part numbers.

Fig. 20 is a card form used for a monthly comparison of costs of standing orders or expense orders, with labor and material costs separated. The form provides for a comparison of monthly costs covering a period of four years—a very valuable record. As an illustration of the manner of using this form, it will be supposed that machine shop repairs are made on order No. 460. Both material and labor are included in the cost of repairs. One of these cards would be used for this order and, at the end of each month, the totals of material and labor used on machine-shop repairs would be entered. The total would be extended in the third column.

CONTINUOUS PROCESS FACTORIES

46. A distinct class of manufacture, which involves certain special problems in cost accounting, is the business in which the process is continuous. For convenience, we refer to such factories as *continuous process factories*. Any factory in which a definite quantity of raw material is converted into a finished product, the quantity of the product not being definitely determined in advance, is classed as a continuous process factory. Examples are flour mills, sugar and salt refineries, nail mills, button and pin factories, and yarn mills.

The problem in factories of this class is to find the total cost of production and the total number of units of production; the former divided by the latter will give the cost per unit.

The cost of production includes the cost of material, labor, and expense. It is necessary, therefore, to keep an accurate record of material and supplies issued to the factory, just as is done in factories manufacturing goods on special orders. Labor costs should be recorded by departments, and the distribution of expense should be by departments, as far as possible. Forms similar to those shown in the preceding pages can be used.

43. *By-Products*. A special problem found in certain industries is to provide for an accounting of salvage, which is either sold in its natural state or manufactured into other products—known as *by-products*. For example, the operation of the cutting room of a

harness factory is a continuous process—sides of leather are cut to produce the largest possible quantity of stock that can be used in the manufacture of harness. The pieces produced vary in size, and it is necessary to figure the cost of cut stock by weight. After this stock has been produced, there remains a certain quantity of scrap leather. This scrap leather is not worth what it originally cost in the sides of leather, but has a certain market value. It should, therefore, be weighed and the value credited against the gross charge for leather to the cutting room.

Now, some manufacturers, instead of selling this scrap as it comes from the cutting tables, convert the best of it into such by-products as heels and washers, selling the residue as scrap. Here is an added manufacturing process—a new department, operated because the price obtained for the by-product makes it profitable. The natural thing to do is to keep accurate cost records for this department, charging the material at scrap prices and take credit for the profits. But some accountants contend that the value of the by-product—less cost of production—should be credited against the material charge to the principal product. Provided the volume and value of the by-product is small, there is no serious objection to this plan, but it is not a safe rule to follow.

In some industries, the value of the by-products is greater than that of the so-called principal product. The large soap factories make glycerine and other by-products of greater value than the soap products. So profitable is this branch of the business that the scrap or residue from the manufacture of soap, is bought from smaller factories, to be used in the manufacture of these by-products. The by-products from the manufacture of gas produces a revenue, in the case of a large gas company, more than sufficient to pay the entire cost of operating the plant. Under these conditions, it is readily seen that the manufacture and sale of by-products should be treated as a distinct branch of the business; otherwise it might easily be shown that the principal product is without cost.

PRODUCTION RECORDS

48. Methods of recording the cost of material and labor used, and of tabulating these costs for individual jobs, have been discussed in the preceding pages. To complete the cost department records,

in the same factory, it is necessary to make a report of each class. The class is usually indicated by the name of the department; when it is not, the name of the class should be substituted. The body of the form records the date started, order number, date finished, quantity, and cost in detail.

The making of this report requires very little additional labor in the cost department. Each day, when costs are tabulated on the finished job cost cards, the details are entered on the report, each job being placed in its proper class. At the end of the week or month, the total column is footed and the report is sent to the general accounting office. If the office and factory are widely separated, the report should be made in duplicate, and a copy retained in the cost department.

CONTROLLING ACCOUNTS

49: Certain controlling accounts are required in the general ledger to complete the connection between the cost and general accounting system—to bind the two together. These controlling accounts, which absorb all of the elements of cost from month to month, furnish the means of proving the accuracy of cost figures; they change the cost system from single entry to double entry.

Two controlling accounts are necessary—*Manufacturing* and *Expense Distribution*. The former finally absorbs the latter and is, therefore, the principal controlling account.

One manufacturing account may represent the entire product of the plant, or there may be several accounts representing different classes of goods, or departments of the business. In machinery manufacture, the foundry is frequently treated as a separate business; in the manufacture of knit underwear, the yarn and knitting mills are operated as separate plants; in a harness factory, separate accounts are kept of the manufacture of harness, collars, and saddles. Each of these divisions, whether departments or kinds of goods, calls for a manufacturing account.

Expense distribution is subdivided in every business having more than one department or shop. The sub-divisions of this account are *General Expense Distribution* and *Shop Expense Distribution*, an account with the latter being kept for each shop.

The sources of charges to manufacturing accounts are reports of material issued to the factory on production orders, Fig. 9, reports of direct and indirect labor employed on production, Fig. 12, and the expense distribution accounts. Credits to manufacturing accounts are derived from reports of finished jobs, as in Fig. 21.

The sources of charges to expense distribution accounts are: reports of material issued to the factory to be used for repairs, Fig. 9, reports of supplies issued, Fig. 11, reports of labor employed on repair jobs, Fig. 12, and the different accounts covering expense items that must be apportioned. A credit to expense distribution account, with a corresponding charge to manufacturing account, closes this account monthly.

50. Controlling Account Entries. The accuracy of the entries to controlling accounts in the general books is of the utmost importance. Upon them depends the proof of accuracy of the cost figures of the cost department on individual jobs.

Material and labor costs are accurately determined. The value of material drawn for all purposes, as shown by the report in Fig. 9, is credited to material purchase accounts, and these accounts are checked against the store-room records. Reports of supplies drawn are handled in the same manner. The labor report, Fig. 12, covers all labor charges and must agree with the pay-roll for the period covered.

In the distribution of expense, however, there are many opportunities for error. While the total expense to be charged against the factory for a given period is accurately determined, the amount is not known until the end of the period. This is represented by the amounts charged to the different expense distribution accounts. In the meantime, to determine the cost of individual jobs, it is necessary to apportion expense on a percentage basis, as explained in the discussion of that subject. Since that ratio for the current period is unknown, it is necessary to assume that the actual ratio for the preceding period still is correct; therefore, that ratio is used in figuring the cost of all jobs. It is only when the expense distribution for the current period is made on the general books and the true ratio determined, that discrepancies, if any, are discovered. Unless the distribution is accurate, the resulting ratio will be incorrect.

Formerly, it was the custom to base the expense ratio on the

actual figure for the preceding year, which meant that changes in expense ratio were not taken into account for an entire year. As a result, the total manufacturing cost shown by the books at the end of the year, did not agree with the costs as figured in the cost department; it was usually much higher.

By operating the controlling accounts, making accurate distributions of expense, the period can be limited to one month. Discrepancies are then quickly discovered and the necessary adjustment made in the expense ratio used. If it is found, at the end of the month that the true ratio of expense is higher or lower than for the preceding month, the percentage to be used for the next month is raised or lowered accordingly. With a careful distribution of the expense items each month, the variations in the ratio should be very slight.

The objection is sometimes made that a monthly distribution of expense is inequitable—that certain expenses may be abnormally high in some months and below the average in others. But with proper controlling accounts, this objection ceases to be serious. Certain expenses are paid in one month that should be distributed over an entire year—as taxes, insurance, and repairs. The amounts charged to the expense distribution accounts each month, are only the amounts that should be apportioned to that month. Taking taxes as an example, one-twelfth of the entire amount should be charged each month.

As an example of adjusting entries for controlling accounts, journal pages are illustrated, in Fig. 21, containing entries made at the end of the month—with explanations. It will be noted that the last entry is a charge to *manufactured goods* account, and a credit to *manufacturing* account of the total cost of finished goods, as shown in the report, Fig. 20.

This account, *manufactured goods*, occupies the same position as a purchase account. It represents the cost of finished goods to the commercial division of the business. To this cost must be added an amount sufficient to cover selling expense and provide a profit, as is done when goods are purchased for re-sale. Selling expense should not be included in the cost department's figures; nothing should be added to the actual cost of manufacture, unless it is desired to add a small amount to provide a factory profit.

May 31st 1909									
Manufacturing Account									
To Materials Purchases per report									
Labor direct " "									
Labor indirect " "									
Shop Expenses distribution - Shop A									
do do - Shop B									
do do - Shop C									
General Expenses distribution									
Total manufacturing expenses for month of May									
Manufactured Goods									
To Manufacturing Account									
Cost of finished goods per report									

Fig. 22. Journal Showing Adjusting Entries

Manufacturing account has been charged for the cost of manufacture—material, labor, and expense—and credited with the cost of finished goods. This does not close the account, however, because all jobs started have not been finished, as there still is work in process. The *balance* of the manufacturing account, then, represents the cost of this work and should agree with an actual inventory of work in process.

No attempt has been made to describe a cost system for a particular business—principles only have been considered in this discussion. Proper application of these principles, however, will result in a practical system for any manufacturing business. The exact manner of applying these principles—the detail—depends on the nature of the business; the results desired are the same in all lines. Physical conditions, nature of the product, the policy of the management, the manner in which the business is conducted—all of these factors must be studied and given due consideration in outlining the system. Then the most simple system that will produce results is best, but in the effort to make the system simple, *necessary* details should not be overlooked. It must be remembered that in a comparison of details of cost, increases are more quickly located than if the comparison refers to finished work.

COST FINDING

One needs but a casual acquaintance with the industrial world of the present day to be aware that the astonishing progress of the past few decades is due to the application of scientific and exact methods. One of the latest manifestations of this spirit is in the attention paid to, and the interest shown in, accurate and economical systems of accounting, and precise methods of determining costs of production or operation. Nor can the latter be separated from the former. It must be stated at the outset and with emphasis, that *a proper and accurate system of book-keeping lies at the foundation of any reliable cost determination.* It is therefore fitting to preface a study of cost finding in textile mills by some consideration of the methods of keeping books and accounts.

It is a primary purpose, in keeping the accounts of a business, to maintain a record of its receipts and expenditures, its assets and obligations, so that a statement can be made as often as necessary, showing the condition of the business, the quality and nature of its resources and liabilities, and the amount and source of its gains and losses.

These records may also be so extended as to be useful in showing the particular sort of product which is most profitable, the exact department where economy or extravagance is practiced, the present costs of departments or products as compared with former costs of similar work, the places where expense should be curtailed, and a basis on which to estimate new work.

When the Interstate Commerce Commission began its work, before any substantial progress could be made, it was found necessary to prescribe for the use of all railroads a method or system of keeping accounts which should be made obligatory in the preparation of reports, as no comparison could be made under the various systems formerly in practice. For instance, in the classification of operating expenses there are now four main divisions, and fifty-three headings of accounts. Some other kinds of business

making government reports are similarly standardized; and, as these systems have been devised by experts in consultation, they are doubtless effective in accomplishing the desired object. If we were to compare methods of bookkeeping in textile mills, we should find equally various ideas worked up, and doubtless some curious evolutions.

To illustrate this, take the manner of charging up the purchase of oils. Some mills carry an Oil account, into which are charged purchases of castor oil, cylinder oil, lard oil, dynamo oil, spindle oil, and perhaps others, every one of which may be used for a different purpose and in a different department. Another mill will charge them all to supplies and perhaps charge to each department the amount used of various kinds. Another will reason thus: Cylinder oil is used in producing power and is as properly chargeable to Power account as the labor of the engineer or the fuel used. Lard oil is used on cutting tools in the repair shop, and therefore chargeable to repairs. Dynamo oil is used only on dynamos and therefore should be put into Lighting account. And so on. Of course, if all oils are charged to Oil account or under any other title, and a record kept of the quantities and kind delivered each department, these amounts may be charged against such department and the same ends will be served.

It is a valid principle that materials and supplies should be charged to the operations or departments in which they are used, rather than to an account of their own. For example, in a mill finishing its own goods, and buying starch for that purpose and for warp sizing, the starch purchased and used should be charged to each operation in either of the ways suggested above, rather than to a Starch account without proper division.

Perhaps the bills embracing the widest variety of accounts are those for freight, and they are also those which can be most certainly and satisfactorily divided and charged. A general Freight account is an abomination, and freight on a mill's *product* should in particular be separated from all other items, as it is not a charge upon manufacture but upon distribution.

The same principle applies also to labor. If in the outside yard department, one man is kept busy packing waste, a second is engaged in the care of tenements, two more in unloading coal, while

another set is handling cotton, the cost of this work should be charged to Waste account, Tenement Maintenance account, and Cotton account, or whatever titles may represent these accounts, rather than be charged in a lump sum to Outside Labor account. The ascertainment of such charges is one of the purposes of bookkeeping.

The number of expense accounts which a mill should carry on will depend upon the character of its product. A mill making an ordinary variety of goods may make at least such divisions as follows and as many more as desired: Cotton, Waste, Manufacturing Labor, Supplies, Repairs, Sizing Materials, Taxes and Insurance, Lighting, Power (with subdivisions Fuel, Supplies, Labor), Salaries and Office Expense, General Expense. There are always some unclassified minor expenses which may be charged thus with propriety, but the temptation to make the Expense account a refuge for carelessness in analyzing expenditures should be resisted.

A cash book with separate columns for each of the principal accounts will save labor in posting, and the accompanying table (See pages 4 and 5) shows how one may be arranged.

It will be noticed that there are two sets of columns on both the debit and credit sides. One set is for a record of the cash, and the other is for the distribution of the charges and credits to the various ledger titles and accounts. One column in the cash record is for the cash in the drawer, and the other one (or as many more as may be necessary) may be used for a check register. No check book with stubs is needed, as checks are entered directly on the cash book.

The second set of columns is for such accounts as may have a considerable number of entries each month. On the debit side there are illustrated one for Rents and one for Cloth Sales. On the credit side are a number, such as Advanced Payments to Employees, Cotton, Sizing Materials, etc. The columns are footed and carried forward to the end of the month, when the footings of these columns are posted to the ledger.

It is not worth while to provide a column for any account in which the labor of posting each entry would be less than that of carrying forward the footings. One or more columns may be left vacant in the heading to be used when any account is receiving temporary money charges, such as Construction or Machinery.

CASH

MANF'D GOODS	RENT	TRANS- FERS	SUN- DRIES	LOCAL BANK	CASH DRAWER	DATE	VOU. No.	ACCOUNT	EXPLANATION	FOLIO	(1)
47 53	65 41	796 40	947 16 1000 00	8947 82 1000 00	241 60	Oct. 5		Amounts To John Smith	Brought forward		(2)
	5 40				5 40	6		" Sundries	Deposited to our Cr.	347	(3)
10 41					10 41			" "	Jas Kent to Date		(4)
								By "	Cloth Sold		(5)
						7	963	" Machinery	B. & M. Ry to 6th		(6)
							964	" J. Russel	On Account	361	(7)
		100 00			100 00		965	" Cash	Withdraw for Drawer		(8)
							966	" Sundries	Paid J. Wagner		(9)
							967	" "	" B. Colvin		(10)
			5000 00	5000 00				To Bills Payable	Discounted Note No. 15	103	(11)
							968	By Sundries	Local Bank 4 mos.		(12)
							969	" "	Eastern Coal Co.		(13)
		1400 00			1400 00	8	970	" Cash	Drew for Pay Roll		(14)
							971	" Sundries	Pay Roll to Oct. 1		(15)
								" Mfg Labor		47	(16)
			69 33					To Adv. Pmts	Collections on Pay Roll	142	(17)
4 60	51 50							" Rent %	" " "		(18)
								Amounts			(19)
62 54	122 31	2296 40	2016 49	14,947 82	1757 41				Carried forward		(20)
											(21)

RECORD

(1)	CASH DRAWER		LOCAL BANK		SUN- DRIES		TRANS- FERS		ADV. PMTS.		POWER		REPAIRS		SUP- PLIES		EXPENSE AND SALARIES		IN- TEREST		FREIGHT ON GOODS		COTTON	
(2)	124	40	5955	40	346	18	796	40	46	13	842	12	540	00	176	72	250	00	120	00	241	12	2721	13
(3)																								
(4)																								
(5)																								
(6)			261	20							87	62	17	20	5	40					123	10		
(7)					27	88																		
(8)	50	00			50	00																		
(9)			100	00			100	00																
(10)	13	20							13	20														
(11)	10	00							10	00														
(12)																								
(13)			100	00															100	00				
(14)			321	10							321	10												
(15)			1400	00			1400	00																
(16)	1450	57									30	16	49	21			25	00						
(17)					1346	20																		
(18)																								
(19)																								
(20)																								
(21)	1648	17	8137	70	1770	26	2296	40	69	33	1231	00	606	41	182	12	275	00	220	00	364	32	2721	13

The sum of the footings of account columns on the credit side should equal the sum of the cash footings on the same side. The work may thus be checked for accuracy as it proceeds. In order to maintain this equality, however, it is necessary to provide a column for Transfers of Cash from Drawer to Bank, or *vice versa*.

The debit side of the cash may be proved in the same way, but due allowance must be made from the cash columns for the amount on hand when the month's business was begun.

Many mill men never realize the difference in the nature of the accounts of expense and income, which they carry upon their books. Probably a majority of establishments have at least three, and sometimes more of these various kinds of accounts.

1. Costs of Manufacturing, including Material, Labor and Supplies.

2. Costs of Distribution, such as Commissions and Freight on Product.

3 Expenses and Income not directly connected with manufacturing, such as Repairs to Tenements, Rent, Storage, etc.

It is not an unusual sight to see mill statements with these accounts reported upon in a confused manner. For instance, Rent account may be made to appear as a profit on Manufacturing.

For a proper system of cost finding it is necessary in addition to the books of debit and credit to maintain careful records of machinery. In each department there should be a permanent daily record of the amount and kind of machinery run on each class of work, and of the amount of work of each kind produced thereon. There should also be a record of all material used, such as cotton, yarn, etc., and of all the kinds of waste made and the amount of each kind. The pay-roll should be properly classified and the occupation of each employee designated. There will, of course, be a record of the product invoiced from the mill, but there should also be a record of its weight before any finishing or aging operation has added to or reduced it.

With these preliminary observations, we may take up the actual work of applying to the results of a period of manufacturing the necessary methods of examination and analysis of the expenses to approximate the costs of manufacture.

As by a mere description, without illustration, it would be

difficult to explain the working out of the various processes with sufficient clearness, it will be best to take an imaginary mill, which we will name the Enterprise Cotton Mills, and a supposititious statement of its operations and expenses. These mills had been recently started, and run only about three months, when the manager directed that an inventory be taken of the stock in process of manufacture and of the supplies, fuel, packing, oil, repairs, cotton, waste, etc.; that all bills be paid; that the books of account be closed, and a statement of expenses and income be prepared, and also a statement of the financial condition of the mill.

The bookkeeper was without former experience in cotton mill accounts and some time after the inventory had been completed he came to the manager with an anxious face and reported that while he had not completely closed the books, he had made a few figures in advance and believed the mills were doing business at a considerable loss.

The manager replied that it was quite possible as expenses were heavy in starting up, but that he had expected that there would be a slight profit. He asked the bookkeeper to go over with him the work done in closing the books that he might set a few prices on stock in process.

The bookkeeper replied that he had taken the stock in process at the value per pound of the cost of the cotton used.

"That is not fair," replied the manager, "because for every ninety pounds of roving now on hand, we have used over a hundred pounds of cotton, and every eight hundred and fifty pounds of yarn has taken nearly a thousand pounds of cotton from the warehouse. So that your books show that cotton used cost us about ten cents a pound, while the cotton in every pound of yarn on hand is worth more than that, for it took nearly fifteen per cent more cotton to make it. It has lost that in waste."

"But," replied the bookkeeper, "we have sold the waste for money or we have it on hand, and I have it also in the inventory."

"That is true," was the reply; "but the value of the waste is small as compared with its cost. The balance of the cost of the cotton used in making the stock in process should be added to the inventory value of the stock in process. Do it this way: In setting a value on the stock in process, make it, say, twelve per cent per

pound more than the cost of the cotton. Take fine roving at, say, ten per cent above cotton, and the balance of the card-room stock at five per cent per pound above cost of cotton. The full value of the cotton or stock in process should be charged to Inventory, and credited to Cotton account. More than that, we started four months ago with no work in process. We now have a mill full of partially manufactured stock. Some nearly ready for market. Some scarcely advanced from the raw material. We must make an estimate of the cost of labor bestowed on the unfinished material and make it a part of the inventory. Furthermore a considerable amount of power has been expended in bringing this cotton to its half-completed stage. Also make an entry covering this, crediting Power and charging Inventory account for its estimated cost. There have been other expenses, but they are of less importance, not so easily estimated, and we shall neglect them."

"This will make a decided difference in our statement," said the bookkeeper, "but I see that it is right and shall make entries to effect the change."

This having been done, the mill showed results of the three months run as follows:

PRODUCTION—406,840 lbs. No. 25 warp yarn, made and sold in warps.			
COTTON—472,635 lbs. costing 9.80 c. per lb., or \$46,318.23			
Less waste on hand and sold, value		1,584.63	
Net cost cotton used		<u>44,733.60</u>	10.96c
MANUFACTURING LABOR,	Carding	\$3,091.90	.76c
	Spinning	3,336.08	.82
	Spooling	1,749.41	.43
	Warping	<u>876.42</u>	<u>.24</u>
		9,053.81	2.22
POWER	Fuel	1,938.50	
	Supplies	102.70	
	Labor	<u>361.40</u>	
		2,462.60	.61
INSURANCE AND TAXES		825.00	.20
REPAIRS AND SUPPLIES,	Material	1,265.20	
	Labor	<u>512.00</u>	
		1,777.20	.44
SALARIES AND EXPENSE		1,375.00	.34
INTEREST		750.00	.19
FREIGHT		3,017.62	.74
COMMISSION AND DISCOUNTS		5,887.60	1.45
Total cost per pound			<u>17.15c</u>

As there was but one kind of product, and practically all of this sold, it is only necessary to divide the items of expense by the product in pounds to obtain the cost per pound of each item, and to add these together, or to divide the total expense, to get the total cost per pound.

Such simplicity of conditions is not often met with, however. Even yarn mills commonly have a diversity of product, and when another six months had rolled around, an inventory had been taken, and the accounts were ready to close, the bookkeeper called on the manager for directions, presenting the following statement of operations, after having charged to Inventory the value of the cotton, and the labor on stock in process.

PRODUCTION OF ENTERPRISE MILLS.

Six months ending June 30th.

YARN MADE AND SOLD	No. 25 warp, Chains	325,000 lbs.
	$\frac{2}{30}$ Skein	120,000 "
	No. 36 "	50,000 "
	$\frac{2}{34}$ "	175,000 "
	No. 25 "	380,000 "
	$\frac{2}{35}$ Chain	150,000 "
	$\frac{2}{10}$ "	30,000 "
CLOTH MADE,	Print Cloth 64 x 64	230,000 "
		<u>1,460,000 lbs.</u>

COSTING:

COTTON:	\$144,500.00.	VALUE WASTE SOLD	\$6,100.
LABOR, Carding	\$11,680.00		
Spinning	13,140.00		
Spooling	4,527.60		
Warping	1,028.46		
Twisting	3,230.00		
Reeling	2,950.00		
Dressing	690.00		
Weaving	7,228.94		
Packing Room	1,825.00		
Repairs	3,000.00		
Power	1,850.00		
Yard	1,675.00	\$52,823.00	

The manager called for the superintendent and showed him the sheet saying "We want now to find out what we have made on these yarns which we cannot do until we know what each cost. Can you show us how to get at it?"

"Why I think it is easy to do that," was the answer; "the estab-

lished method of distributing cost is from the basis of the average number. *First*, ascertain what processes and expenses are common to all the varieties of the product, such as Carding, Spinning, Repairs, Insurance, etc. These are termed Costs in Common. *Second*, separate the processes and expenses undergone by portions of the product alone, such as reeling for the skein yarn, sizing materials for cloth, different commissions for yarn and cloth, etc., and find how many pounds have been submitted to each special cost. *Third*, ascertain the average number of the mill product submitted to each special cost. *Fourth*, divide the sum total of the costs in common by the total pounds produced. This is the cost per pound in common, of the average number. This cost per average number is thus distributed over the whole product: each kind of product bearing the cost per pound in proportion to the number of the yarn. The special costs are divided in the same manner over the kinds of product they affect, through the medium of the average number of the products affected."

Following this method these costs must be rearranged, and some of them, as Power, Repairs, and Commissions must be divided. They are common to all, but Power and Repairs have a special cost for weaving, which we will estimate and set apart as a special cost, deducting it from the totals, and consider the remainders as common costs.

The Manufacturing Costs may then be listed as follows:

COSTS COMMON TO ALL THE PRODUCT OF THE MILL

LABOR, Carding		\$11,680.00
" Spinning		13,140.00
" Packing Room	\$1,825.00	
SUPPLIES, Packing Room	625.00	2,450.00
LABOR, Repairs, 94%	2,820.00	
SUPPLIES, Repairs, 94%	7,322.00	10,142.00
LABOR, Yard		1,675.00
" Power, 96 %	1,776.00	
SUPPLIES, Power, 96 %	7,055.00	8,831.00
INSURANCE AND TAXES		2,800.00
INTEREST		3,000.00
SALARIES AND OFFICE EXPENSE		2,900.00
EXPENSE ACCOUNT		975.00
		<hr/> 57,593.00

The total costs in common to all the product was \$57,593.00 ÷ 1,460,000 (pounds produced) = 3.9447 cents per pound of yarn of the average number (26.866).

We proceed on the hypothesis that the cost of making yarns varies in the same ratio as the number. If the costs in common for No. 26.866 = 3.9447 cents per pound, then to find the cost for No. 10 yarn

26.866 : 3.9447 cents :: 10 : 1.468 cents per pound.

In the same way we find the costs in common per pound to be:

For No. 25 Yarn	3.670 cents
" 28 "	4.110 "
" 30 "	4.404 "
" 36 "	5.285 "

The special costs may be classified as follows, and the pounds subjected to each operation are tabulated for convenience of analysis, with the exception of the special costs on print, which are dealt with in bulk.

SPECIAL COST ON CHAIN YARN, PLY YARN, AND WARP OF PRINT CLOTH

Spooling	\$4,527.00
Special Cost on Chain Warps and Warp of Print Cloth, Warping	1,026.48
Special Cost on Ply Yarns, Twisting	3,230.00
Special Cost on Skein Yarns, Reeling	2,950.00

SPECIAL COST ON PRINT CLOTH

Dressing	\$ 690.00
Weaving	7,228.94
Repairs, Weaving, Labor (6%)	180.00
" " Supplies (6%)	468.00
Power Weaving, Labor (4%)	74.00
" " Supplies (4%)	295.00
Sizing Materials	506.00
	9,441.94

The rule for finding the average number of a plain fabric, is based upon the principle of reducing the yarns to an equivalent weight of number one yarn, and then dividing again into the same number of threads, as the previous counts, but all of an equal size.

The rule is expressed as follows: Divide the threads per inch of warp, by the number of the warp yarn, and add the quotient to the picks per inch divided by the number of the filling yarn. Divide the sum of the picks and sley by the sum of the two quotients, above

described, and the result will be the average size or number of the yarn.

The same idea will enable us to find the average number of the mill product as follows:

No. 10 Yarn		30,000 lbs. x 10	300,000
" 25 " Warp Chains	325,000 lbs.		
" 25 " Skeins	380,000 "		
" 25 " $\frac{2}{25}$ Chains	150,000 "	855,000 lbs. x 25	21,375,000
" 28 " $\frac{2}{28}$ Skeins	175,000 "		
" 28 " Print Cloth Warp	128,800 "	303,800 lbs. x 28	8,506,000
" 30 " $\frac{2}{30}$ Skeins		120,000 lbs. x	303,600,000
" 36 " Skeins	50,000 "		
" 36 " Print Cloth Filling	101,200 "	151,200 lbs. x 36	5,443,200
		1,460,000 lbs.	39,224,600

$39,224,600 \div 1,460,000 = 26.8662 = \text{Average number spun.}$

	SPOOLING	WARPING	TWISTING	REELING
$\frac{2}{10}$ Skein Yarn as $\frac{1}{10}$	30,000 lbs.	lbs.	lbs.	lbs.
" $\frac{2}{10}$			30,000	30,000
25 Warp Chains	325,000	325,000		
$\frac{2}{25}$ Chain as $\frac{1}{25}$	150,000			
" $\frac{2}{25}$	150,000	150,000	150,000	
25 Skeins				380,000
$\frac{2}{28}$ " as $\frac{1}{28}$	175,000			
" "			175,000	175,000
28 Print Cloth Warp	128,800	128,000		
$\frac{2}{30}$ Skein as $\frac{1}{30}$	120,000			
" $\frac{2}{30}$			120,000	120,000
36 Skein				50,000
	1,078,800 lbs.	603,800 lbs.	475,000 lbs.	755,000 lbs.

The cost per pound of each of these operations on each variety of product is estimated after the same manner, as the cost in common. This we will illustrate in the cost of spooling. It will be noticed that the two-ply warps undergo spooling twice, first as single yarn, and again as double yarn. In determining costs, ply

yarns are considered single yarns of equal weight, that is $\frac{2}{8}$ s is treated as single 14s.

SPOOLING

No. 10 Yarn		30,000 lbs. \times 10 =	300,000
" 25 Warp Chain	325,000 lbs.		
" $\frac{2}{5}$ Chains as $\frac{1}{25}$	<u>150,000</u> "	470,000 " \times 25 =	11,875,000
" $\frac{2}{5}$ " " $\frac{2}{25}$		150,000 " \times 12.5 =	1,875,000
" $\frac{3}{8}$ Skein as $\frac{1}{28}$	175,000 "		
" 28 Print Cloth Warp	<u>128,800</u> "	303,800 " \times 28 =	8,506,400
" $\frac{2}{30}$ Skein as $\frac{1}{30}$		120,000 " \times 30 =	3,600,000
Total Pounds Spooled		1,078,800 "	26,156,400
26,156,400 \div 1,078,800 = 24.246 Average Number Yarn Spooled.			

The total cost of spooling was \$4,527.00 which divided by 1,078,800 equals the cost per pound of spooling the average number or .4196 cents per pound for spooling No. 24.246 yarn.

.4196 cents \div 24.246 = .017306 cents cost per unit of number, or cost per hank of spooling number one yarn.

.017306 \times 10 =	.17306 cents cost of spooling No. 10 Yarn
.017306 \times 25 =	.43265 " " " " " 25 "
.017306 \times 12.5 =	.21632 " " " " " $\frac{2}{5}$ "
.017306 \times 28 =	.48457 " " " " " 28 "
.017306 \times 30 =	.51918 " " " " " 30 "

The correctness of these figures can be proved as follows:

30,000 lbs. of No. 10 Yarn Spooled at	.17306 Cost	\$ 51.92
475,000 " " " 25 " " "	.43265 " "	2,055.08
150,000 " " " $\frac{2}{5}$ " " "	.21632 " "	324.58
303,800 " " " 28 " " "	.48457 " "	1,472.12
120,000 " " " 30 " " "	.51918 " "	623.02
		<u>\$4,526.62</u>

By the same methods we find the cost of the special costs of Warping, Twisting and Reeling to be as follows:

Cost of Warping No. 25 Yarn	.1886 cents per pound
" " " " $\frac{2}{5}$ " "	.0943 " " "
" " " " 28 " "	.2112 " " "

Cost of Twisting No. $\frac{2}{10}$ Yarn	.2573 cents per pound
" " " " $\frac{1}{5}$ " "	.6434 " " "
" " " " $\frac{2}{8}$ " "	.7206 " " "
" " " " $\frac{2}{30}$ " "	.7720 " " "

	2-10 SKEINS	25 SKEINS	25 CHAINS	2-25 CHAINS	2-28 SKEINS	2-30 SKEINS	36 SKEINS	PRINT CLOTH 56.2% WARP 43.8% FILL.
Cotton	5,000	1,000	10,000	10,000	10,000	10,000	10,000	10,000
Strippings	3,000							
	8,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Less Waste Value	.242	.484	.484	.484	.484	.484	.484	.484
	7,758	9,516	9,516	9,516	9,516	9,516	9,516	9,516
Costs in Common	1,468	3,670	3,670	3,670	4,110	4,404	5,285	2,309 wp
Spooling as Single Yarn	.173		.423	.433	.485	.519		2,314 fill
“ “ Double “				.216				.273
Warping			.189	.094				.119
Twisting	.257			.643	.721	.772		
Reeling	.083	.412			.231	.248	.594	4,105
Dressing etc., Print Cloth	9,739	13,593	13,808	14,572	15,063	15,459	15,395	18,636
Freight	.591	.591	.591	.591	.591	.591	.591	.650
	10,330	14,189	14,399	15,163	15,654	16,050	15,986	19,286
Commissions	1,018	1,399		1,494	1,542	1,581	1,575	.375
Full Cost of Each Product	11,348	15,588	14,399	16,657	17,196	17,631	17,561	19,661

Cost of Reeling	No.	$\frac{2}{10}$ Yarn	.0825 cents per pound				
"	"	"	"	$\frac{2}{25}$	"	.2310	" " "
"	"	"	"	$\frac{2}{30}$	"	.2475	" " "
"	"	"	"	$\frac{2}{25}$	"	.4125	" " "
"	"	"	"	$\frac{2}{36}$	"	.5940	" " "

Cost of Special Operations for Print Cloth 230,000 lbs. \$9,441.94.
 $\$9,441.94 \div 230,000 = 4.1052$ cents per pound.

The stock used in these yarns and goods is the same, excepting that the $\frac{2}{10}$ Skein Yarn has been made one-half of cotton and one-half card strippings.

The balance of Cotton account showing the cost of cotton for the mill is therefore divided by the total product, less one-half the amount of $\frac{2}{10}$ skein made.

$$1,460,000 - 15,000 \text{ lbs.} = 1,445,000 \text{ lbs.}$$

$\$144,500.00 \div 1,445,000 = 10$ cents per pound for cotton for each pound of yarn made, excepting $\frac{2}{10}$ skeins. The $\frac{2}{10}$ skeins were one-half strippings worth 60 % of the cost of cotton, or for the whole amount of yarn made:

15,000 lbs. @ 10 cents for cotton	\$1,500.00
15,000 " " 60 % of 10 cents	900.00
30,000 lbs, at an average price of 8 cents =	<u>\$2,400.00</u>

The value of the strippings used should therefore be added to the value of waste sold. That much of waste used not having been credited to waste account, previously, it should now be credited to the products made from clean cotton.

A deduction for the value of waste may now be made from the cost of cotton.

Waste sold \$6,100.00 plus \$900.00 waste also made but used = \$7,000.00. $\$7,000 \div 1,445,000 = .484$ cents credit to cost cotton per pound of product for waste sold. (Only one-half of this per pound of $\frac{2}{10}$ skein.)

The only two items now remaining undistributed are the Freight on product and Commissions.

The freight paid in this case is more on the print cloth than on the yarn, per pound, being 65 cents per hundred, and the balance divided among the other products, equally. Of commissions it should be said, before the division of the cost, that those on the print

cloth amount to above 2 % of the cost, the No. 25 chain warps were sold direct, and no commissions were paid on these, while the balance amounting to about 9.85 % was divided among the other products on a percentage basis of the cost as shown below.

At this stage the proof of the accuracy of the mathematical work may be had thus:

30,000 lbs. of	$\frac{2}{10}$	Skein	at 10.330 cents per pound, cost	\$ 3,099.00
380,000 " "	25	"	14.189 " " "	53,918.20
325,000 " "	25	Chain	14.399 " " "	46,796.75
150,000 " "	$\frac{2}{10}$	"	15.163 " " "	22,744.50
175,000 " "	$\frac{2}{10}$	Skein	15.654 " " "	27,394.50
120,000 " "	$\frac{2}{10}$	"	16.050 " " "	19,260.00
50,000 " "	36	"	15.986 " " "	7,983.00
230,000 " "		Print Cloth	19.286 " " "	44,361.80
				<u>\$255,547.75</u>

Cost of Cotton	\$144,500.
Less value of Waste sold	6,100.
	<u>\$138,400.</u>

Labor	52,823.	
General Charges, without Commissions	<u>34,746.</u>	\$225,969.00
This discrepancy might be avoided by carrying the work to further decimals.		<u>421.25</u>

The bookkeeper having worked out the costs of manufacturing as above under the supervision of the superintendent, the processes and results were shown to the manager. The costs of some of the yarns were more and of others less than he expected, and after an examination of the tables, the manager once more sent for the superintendent.

"I have examined the way you get at the cost of the different numbers of yarn, etc., and think I understand it, and believe it is about right. But there are one or two inquiries I wish to make. *First*, the idea underlying the whole operation seems to me a mere assumption that the cost will vary as the number or fineness of the yarn. This may be so or it may not. I do not see anything to prove it. How do you know this, or don't you know it? There may be some reason for believing so; if there is, I would like to know it, but I confess that it seems to be taking a great deal for granted."

"The average number system of cost finding," replied the superintendent, "was not original with me. For many years it

has been used by mill men as a convenient and ready way of reckoning costs and making estimates on cotton goods. I have been told that early New England manufacturers adopted it after a careful examination in detail of the cost of various operations on different organizations of goods. I suppose they were satisfied of its approximate accuracy. Some justification is afforded by such figures as the following, which represent actual results in a large mill in New Hampshire for the six months ending May 2, 1885. This company operated three mills, making various organizations, and you will note that the total manufacturing labor costs vary very nearly as the average numbers. In fact, do not vary from this standard more than the same mill might vary its own record in the changing vicissitudes of continuous operation."

	NO. 1 MILL	NO. 2 MILL	NO. 3 MILL	AVERAGE
Average No. of Product	26.83	22.93	18.12	21.64
Labor, Carding	1.131 cts.	1.004 cts.	.757 cts.	.919 cts.
" Warp Spinning	.566 "	.394 "	.331 "	.406 "
" Filling "	.465 "	.438 "	.385 "	.420 "
" Dressing etc.	.517 "	.454 "	.348 "	.420 "
" Weaving	2.779 "	2.527 "	1.825 "	2.260 "
	5.458 "	4.817 "	3.646 "	4.425 "

Based on the cost of the average number for the whole plant, the costs would be as follows:

5.487	4.680	3.705
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By these figures it will be seen that the variations of the actual cost from the estimated cost by the average number is as follows.

No.	18.12	.059	cents	per	pound
"	22.93	.128	"	"	"
"	26.83	.029	"	"	"

The greatest variation is therefore less than three-tenths of one per cent.

"Further than this, I think I can show you why this method has some basis of reason in it. As you are well aware, a most important element in the cost of any product is the amount that can be produced in a given time. If I were spinning, say, number 30 yarn, and some one should come along with an invention which would enable me, other factors remaining the same, to double the production per spindle, the cost of spinning would be reduced nearly one-half. So, if I should change to a coarser yarn the production would

be increased, and the cost per pound decreased. Not proportionately decreased, but in *nearly* that ratio. As the amount of product increases, however, there is so much more material to be handled, so that there is more expense for labor in attendance and handling.

"If you examine the tables of production of spinning frames you will find that the pounds per spindle decrease as the yarn grows finer, in a ratio somewhat exceeding the reverse ratio of the change in number. For example, one of the production tables in common use gives the production in pounds per spindle per day as follows:

No.	8	Yarn	1.082	lbs.
"	16	"	.497	"
"	24	"	.294	"
"	32	"	.200	"
"	40	"	.152	"

"It will be noticed that 8 (yarn) is one-fifth of 40 (yarn) but the production of No. 8 is rather more than five times as great. This increase in ratio approximately covers the increased cost of attendance and handling of the coarser yarns. It is thus that it comes about that the cost of manufacture varies in nearly the same ratio as the number. To be sure the spinning frame is not the only machine in a mill, but it is to a considerable degree the gauge of the production, and the elementary principle holds in all departments that the higher the number of yarn the greater the cost of production and manipulation. Labor Costs are not the only ones affected by production. The cost of Power, Taxes, Insurance, Salaries, Repairs, Interest, and some other items of expense are similarly affected by the rate of production.

"The same New Hampshire mill I have mentioned had a practice of charging Interest, Insurance, Taxes, General Expense and Salaries at an equal amount per pound whether the average number were 17 or 27, and whether the production were consequently greater or less. This seems to me denying the principle in its most evident application. For an increase or loss in production would not affect the gross amount of these expenses, but the more pounds produced the more to divide them among and proportionately the less per pound."

"I concede the force of much you have said," answered the manager, "and I imagine that for numbers of a moderate range such a system might be very convenient and as efficient as any

that could easily be devised. I can also see that it might find a widespread and proper application in mills under the circumstances apparently prevailing in the mill you instanced where there are a number of organizations not widely dissimilar, and without a wide range in the numbers of yarns spun. Its weakness lies in there being no means of proving its results, no certainty that its limitations have been observed, and no recognition of varying conditions.

“As an illustration of my first objection, you cannot, in any way, prove that the costs of Reeling, as distributed by you over the yarn made into skeins the last six months, are just. In fact they do not very well agree with the prices per pound we paid for the work. This also illustrates my second point. Further, I do not suppose you would claim that making number 100 yarn would cost just ten times as much as making number 10 yarn. That is, there is a limit to the average number method of reckoning costs.

“And lastly, suppose two sateens, woven, one with a warp face, and another of a similar organization but with a filling face. They would both have the same average number, but would both cost the same? And two fabrics of utterly dissimilar organization might have the same average number and according to your theory would have the same cost per pound, which I do not think probable.

“Furthermore, the changes and extensions we propose in this plant will bring in such varying factors, that our past methods will be crude and incomplete. It has been so, to some extent, already, for our weaving has introduced an element which along with, and in addition to, our yarn, makes the separation of expenses of operating the departments a problem for serious study.

“I have been thinking and enquiring about this matter for some time and I propose in another six months to install a system by which I may *know* what our goods cost, prove the estimates to my own satisfaction, and challenge any one to dispute their accuracy.

“In the first place, I propose to separate the Manufacturing and the Distributing expenses. We have been fortunate in our short experience in disposing of our product as fast as made, but this

will not always be our happy lot. Under these past circumstances the expense of Freight and Commission might, with fairness to the results, be considered costs along with other expenses, but they are different in their nature, belonging to the commercial department of our business along with such charges as advertising and bad debts. If we, in the next six months, find ourselves with a lot of unsold goods, on which we have paid no freight or commissions, the amount of these charges which we have paid must not be charged into manufacturing, with labor and supplies, but kept in a separate account.

"We shall have a plant selling a part of its product as yarn, and weaving the remainder of its yarn into cloth. We may even be compelled to purchase some yarns. Under these conditions the apportionment of the expense of Repairs, Supplies, Power, Insurance, Taxes, etc., should not be left to guesswork, even though we style the guess an estimate, but should have some basis in accounting of the amount chargeable to each department. This the method we have just followed does not afford."

The manager at once put in operation a series of reports for the purpose of affording detailed information regarding the cost of each operation, which were placed on record, and made a basis for making up the estimates of cost at the end of another six months' period.

In the meantime there had been completed some changes and additions for the purpose of putting a part of the mill on colored work, and a coarse cheviot was made in this portion of the mill, so as to utilize the waste.

PRODUCT OF THE ENTERPRISE COTTON MILL

Six months ending Dec. 29, was as follows:

102,000	lbs.	Cheviot
160,000	"	Print Cloths
250,000	"	Madras
100,000	"	1-25 long chain Warp Yarns
120,000	"	1-28 Skeins
80,000	"	2-28 "
812,000	"	Total

The organization of the cloths was as follows:

	Warp Yarn	Filling Yarn	Sley	Picks	Widths	Yds. Per lb.	% Warp	% Filling	% Sizing on Warp
Cheviot.....	8	12	66	45	29	2.15	70	30	6
Print Cloth	28	36	64	64	28'	7.00	56	44	6
Madras.....	25	32	56	60	28	6.00	60	40	6

The weight of the cloth given above is as it comes from the looms. There are several factors tending to modify this weight, as compared with the weight of the yarn originally consumed in the making of the cloth.

The principal of these are, the weight added by sizing, the effects of coloring and bleaching, and the loss in waste.

If the mills were making but one grade of goods, these would be of no special importance. But comparing the weight of woven goods with the weight of yarns, it is worth while to consider whether some allowance should not be made in order to put the yarns sold on a just footing with the cloth woven.

As concerns the sizing, the weight of starch and other compounds used equals about six percent of the weight of yarn dressed. This is equivalent to approximately four percent of the weight of the cloth. And if no other factor entered into the calculation it would be necessary to reduce the weight of warp yarn used in weaving by this six percent, in order to place it on a parity with other yarns. But since spooling, in the operation of warping, beaming, dressing, drawing-in and weaving, there has been a further loss of weight in waste. This loss has been greater on the warp yarns than on the filling, because of the more handling of the chains and the chafing of the warp. This loss is greatest on the yarns which have been sized, and may have amounted to one and one-half percent in weave room sweepings alone; a loss partly of warp and partly of sizing. On the whole, the waste in operations subsequent to spooling, is sufficient to largely offset the gain in sizing, and we make no allowance for the weight added in sizing.

Furthermore, dyeing and bleaching affect the weight of cotton. The madras is largely white with colored stripes. This white yarn or cotton is bleached, which causes a loss in weight.

But there has been an increase of weight in dyeing the colored yarn, varying according to the nature of the dye, and the depth of shade. In this instance we will estimate that one offsets the other, so that no allowance need be made either way for dyeing or bleaching. In the case of the cheviots, there is no bleached stock of consequence used in them, but the colors, both warp and filling, are mostly heavy or dark ones, and it is thought well to make an allowance of two percent from the weight of the cloth, in estimating the amount of gray yarn or cotton used in their manufacture.

The cheviots for purposes of cost estimate will therefore be 100,000 lbs. instead of 102,000 lbs.

The cheviots were a coarse colored fabric, manufactured to utilize card strippings and flyings. The yarn being composed of about seventy percent waste of this character, with some cleanings from picker notes. These were dyed in the loose cotton or waste, and spun thus, into colored yarns. The goods were finished and shipped in bales.

The print cloths were the same organization as before and shipped in rolls.

The madras were a medium grade fabric, with bleached and colored warp yarns. The bleached warp was spun from bleached cotton, but the colored warp was spun in the gray and made into long chain warps, dyed, beamed again, and dressed on a slasher. A portion of the warp yarn for these goods was of printed yarn, and as the mill did not care to purchase a machine for this purpose, the yarn was bought, printed, in long chain warps, amounting to 10,000 pounds. A portion of these goods, also, was woven on drop box looms for the purpose of making check patterns. The filling in all the stripes was bleached, and this with the bleached and colored filling in the checked patterns was spun from bleached or colored cotton. Only a small amount of colored filling was used, as the filling stripes of color were mostly small. The warp in these goods was irregular, some of the patterns having small cords where several warp threads were woven as one.

For the goods described above, and the yarns sold, the following yarns were required:

No. 8 Yarn, Cheviot Warp	70,000 lbs.
" 12 " " Filling	30,000 "

No. 25	"	Madras Warp	150,000 lbs.	
" 25	"	Warps Sold	100,000 "	
" 25	"	Total		250,000 lbs.
" 28	"	Print Cloth Warp	89,600 lbs.	
" 28	"	1-28 Skeins	120,000 "	
" 28	"	2-28 Skeins	80,000 "	
" 28	"	Total		289,000 "
" 32		Filling for Madras		190,000 "
" 36	"	" Print Cloth		70,400 "
				<u>810,000 lbs.</u>

We may divide the cost into three divisions,

1st, The Stock or Material.

2nd, The Labor in Manufacturing.

3rd, The General Charges, Supplies, Power, Etc.

We will take these up in the order named.

The Stock or Material put in process for these yarns and goods was, as previously stated,

1920 Bales of Cotton,	903,614 lbs. costing	\$72,289.12
77 " " Strippings,	35,000 " "	1,820.00
No. 25 Printed Yarn	10,000 " "	2,500.00

Passing by for the present the Printed Yarn, we recall that seventy percent of the cheviot, and all of the other output of the mill, are made from the same general quality of cotton. We may therefore separate the stock used into these two classes, and on the assumption that the proportion of waste made has been the same in both classes, proceed to find the percentage of waste, and then work back by means of this to estimate the amount of waste and cotton originally put in process, in each class of stock. For it has not been practicable under the circumstances to keep an accurate weight of it. We then approximate the value of the waste used which was made in the mill, and credit the cost of clean cotton with this amount. The waste used has been from clean uncolored cotton. This value of the waste sold is then credited to each class. This value is either divided according to records of waste made, or on a percentage basis in absence of data.

The details are worked out as follows:

The Stock in process, Dec. 29	94,100 lbs.
" " " " July 30	76,700 "
Excess Stock in Process Dec. 29	<u>17,400 lbs.</u>
Product (Less Yarn Purchased)	800,000 "
	<u>817,400 lbs.</u>

Cotton Put in Process	903,614 lbs.
Waste Purchased and Put in Process	<u>35,000 "</u>
Total Material Put in Process	938,614 lbs.
Less Product Plus Gain in Process	<u>817,400 "</u>
Gross Waste	121,214 lbs.
Gross Waste Equals 14.83% of 817,400 lbs.	

Product of Cheviot	100,000 lbs.
In Process Dec. 29, Cheviot Stock	<u>9,000 "</u>
	109,000 lbs.

$109,000 + 14.83\% = 125,164$ lbs. estimated amount of stock, made up of good cotton (30%), purchased waste and in the mill (70%) both together making the 125,164 lbs. estimated as started in process for the cheviots.

Total Cheviot Stock			125,164 lbs.	
Less Good Cotton (30%)			<u>37,550 "</u>	
Waste Used—Purchased, and Made (70%)			87,614 lbs.	
Waste Purchased			<u>35,000 "</u>	
Waste Made and Used in Cheviots			52,614 lbs.	
Stock in Process July 1, all Good Cotton	76,700 lbs.	\$ 8,437.00		
Cotton Put in Process, for Goods other than Cheviot	<u>866,064 "</u>	<u>69,285.12</u>		
	942,464 lbs.	\$77,722.12		
Cotton Used for Cheviot	37,000 lbs.	\$3,004.00		
Waste Purchased	35,000 "	1,820.00		
" Made and Used	<u>52,614 "</u>	<u>2,735.93</u>		
	125,164 lbs.	\$7,559.93		
" Made and Used, Cr			<u>52,614 "</u>	<u>2,735.93</u>
			890,150 lbs.	74,986.19
On Hand in Process Dec. 29	9,000 "	543.60	85,100 "	7,488.80
	116,164 lbs.	7,016.33	805,050 lbs.	67,497.39
Waste accounted for and not	<u>16,164 "</u>	<u>323.28</u>	<u>105,050 "</u>	<u>2,101.00</u>
Total net Cost of Stock	100,000 lbs.	\$6,693.05	700,000 lbs.	\$65,396.39

By these processes we arrive at 6.693 cts. per lb. as cost of material for Cheviot, and $(65,396.36 \div 700,000)$ 9.342 cts. for all other product, excepting Madras, to which there is a further charge for 10,000 lbs. of Printed Yarn costing \$2,500.00, used only on this work. This is equivalent to 1.00 cts. per pound of all Madras; but as only 8,000 lbs were consumed, 2,000 pounds being in process, the cost for yarn was .800 cts. per pound.

This yarn has been neglected heretofore, because in this instance it is a small amount in proportion, and the waste made from it, is inconsiderable. If large amounts of yarn were purchased in different shapes, it might be necessary to separate the different departments, charging to each its material used and waste made and crediting the output.

THE MANUFACTURING LABOR

The basis for the apportionment of the labor cost, consists of a series of weekly reports from each department, covering the amount of machinery running and the amount of product, and the cost of each operation as computed immediately upon the making up of the pay-roll. These reports are tabulated, and at the end of the six months, or other period, when the costs are made up, their totals are compared with the amount of work ultimately produced by the mill. The costs are based upon the production of the room; but on account of the loss by waste and other causes, the final output of the mill, upon which the cost must be reckoned, is less than the room product. The reported costs are, therefore, less than the actual costs, and are subject to the revision noted above.

Pay-rolls are subject to change, and the total labor cost of each department on the reports, is corrected by the actual amount expended.

This is exemplified in the case of the Card Room as follows: A single weekly report is shown, and the summary of the work for the six months.

ENTERPRISE COTTON MILLS

Cost of Roving for.....week ending Oct. 3d, '06.

Hank Roving.....	1.00	1.50	5.20	6.00
Fly Frame Spindles Run.....				
Pounds Roving Made.....	3180	1272	25400	4770
Picking.....	\$ 2.25	.90	18.00	3.37
Carding and Drawing.....	\$ 6.00	2.52	50.40	9.45
Slubber.....	\$ 1.50	.90	28.60	7.85
Inter. Frames.....	\$ 2.60	1.50	45.16	11.10
Fly Frames.....			77.48	19.92
General Room Expense.....	\$ 1.60	.75	41.20	8.20
Total Wages.....	\$13.95	6.57	260.84	59.89
Cost per pound, cents.....	.440	.517	.103	.152

SUMMARY FOR THE SIX MONTHS

Hank Roving	1.00	1.50	5.20	6.00
Total pounds made, from reports	80,720	32,800	650,900	109,200
Total pounds yarn and cloth from above	70,000	30,000	600,000	100,000
Add Inventory Dec. 29	6,100	900	58,800	3,300
	76,100	30,900	658,800	103,300
Deduct Inventory June 30			54,700	
	76,100	30,900	604,100	103,300

The sum of the cost from the weekly reports, during the six months is	}	\$350.16	\$156.58	\$6,680.27	\$1,230.26
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These make a total of \$8,417.27. The corrections and changes in the card- room payroll after leaving the room, have been such as to make the corrected total as shown by the ac- count books \$8,263.36 and the necessary correction re- duces the costs to	}	\$348.16	\$155.68	\$6,536.36	\$1,223.16
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The revised cost of making the roving should be obtained next, and if these total costs are divided by the sum of the goods sold plus the increase of the stock in process the results will give the actual cost per pound.

\$ 348.16 ÷ 76100 = .457c	Cost per Pound of No. 1.	Hank Roving
155.68 ÷ 30900 = .504	" " " " " 1.50	" "
6536.30 ÷ 604100 = 1.082	" " " " " 5.20	" "
1223.16 ÷ 103300 = 1.184	" " " " " 6.	" "

The value of the labor on the roving and yarns in process at the end of the six months is now computed.

6100 lbs. 1.	Hank Roving @	.457c = \$ 28.38
900 " 1.50	" "	.504 = 4.53
58800 " 5.20	" "	1.082 = 636.21
3300 " 6.	" "	1.184 = 39.07
		<u>\$708.19</u>

This, with the value of labor in subsequent operations bestowed on the stock in process, as disclosed by the inventory, is credited to Manufacturing Labor in closing the account books, or retained as the balance of the account, before charging off the remainder into Manufacturing Account.

The further uses of the cost of rovings in the yarn and cloth output of the mill, will be illustrated later. .

A table should be prepared showing the stock in process in each department, of the amount of stock of each kind on hand, both at the beginning and end of the period, but is omitted from this illustration.

The summaries of the Labor Costs in each department or operation must be treated in a similar manner. It will not always be the case that the yarn on hand at the end of the period will be greater than at the beginning. They are as often less. By the system outlined above this will adjust itself.

It will be noticed that the pounds of roving made, obtained from the weekly reports, vary about six percent from the roving accounted for by the product of the mill plus the inventory, but in later operations where there is less subsequent waste, this difference should be considerably reduced.

TABLE G.

ENTERPRISE MILLS. SPINNING ROOM REPORT.

Cost per pound of Spinning for week ending September 22.

Number of Yarn.....	28 Warp	8 Warp	12 Fill	25 Warp	32 Fill	36 Fill	Total
Spindles Run.....	8,000	448	224	5,600	3,600	2,688	20,320
No. of Pounds Spun.....	11,200	2,600	900	9,600	4,200	3,000	31,500
Wages							
Spinners.....	\$65.80	\$3.60	\$2.07	\$40.45	\$21.60	\$18.00	.....
Doffers.....	23.40	2.06	1.87	14.36	7.20	7.20	.....
General Room Expense.....	32.48	2.83	1.80	24.67	13.50	9.60	.....
Total Wages.....	\$121.68	\$8.43	\$5.74	\$79.48	\$42.30	\$34.80	\$292.43
Cost per pound, cts.....	1.086	.324	.638	.828	1.010	1.160	.....

TABLE H.

ENTERPRISE MILLS. WEAVING ROOM REPORT.

Cost per pound for weaving, week ending September 22, 1906.

Kind of Goods	Cheviot	Print	Madras Plain Looms	Madras Check Looms	Total
Looms Run.....	27	150	150	75	402
Pounds Woven.....	4,000	6,400	7,350	3,333	21,083
Cuts Woven.....	200	3,100	735	330	.....
Wages					
Weavers.....	\$47.90	\$175.60	\$230.85	\$119.54	.....
Other Hands.....	6.10	22.83	31.15	29.92	.....
Total Wages.....	\$54.00	\$198.43	\$262.00	\$149.46	\$663.89
Cost per pound, cts.....	1.35	3.10	3.56	4.48	.....

Weekly cost reports of the same general discription are made for each department. Samples of these for the spinning and weave rooms are given in Tables G and H.

Passing over for the present the further consideration of Labor Costs, we take up the cost of Repairs, Power, etc., and find the following charges to be divided among the product and the inventoried stock.

LABOR	Repairs Machinery	\$1368.20	
"	Boilers and Engine Room	1286.93	
"	Repairs Buildings	60.00	
"	Watch	350.00	
"	Electric Lights	212.50	
"	Moisteners	20.	\$ 3,297.63
MATERIALS	Repairs Machinery	\$1182.37	
"	" Buildings	120.	
"	Fuel	7000.	
"	Fire Protection	70.	
"	Supplies, Store Room	1576.32	
"	" Special	6895.33	16,844.02
TAXES			5,500.
INSURANCE			900.
SALARIES AND OFFICE EXPENSE			4,000.
EXPENSE, MISCELLANEOUS			500.
YARD			600.
INTEREST			3,600
			<u>\$35,241.65</u>

In addition to these there should be a sum set aside or charged off for depreciation of the Machinery and Buildings which will be estimated later.

An analysis of these expenses for the purpose of classification will disclose that they may be fairly grouped in three general divisions.

First: Those which are incurred in maintaining the plant in good repair and condition, protecting it from danger of fire and robbery and providing the necessary supplies for operation, Maintenance, Protection and Supplies.

Second: Expenses incurred in the generation and transmission of Power, and of Steam for other uses than Power.

Third: The cost of administration of the general conduct of the business.

Under the heading Maintenance and Supplies, we collect first the cost of Maintenance in general, dividing between Machinery and Buildings and excluding the particular repairs of which a separate account has been kept. These include, Taxes on the value of Machinery, Insurance on Machinery, Fire Protection and Watchmen in their proportion, and Depreciation.

For the purpose of subdivision of these expenses make a detailed list of machinery in the form shown in Table M, giving in appropriate columns the value of each machine, and of the total

value for each operation. By this means we find the grand total value of machinery to be \$250,000. A conservative estimate for depreciation may be set at four percent, or \$10,000. This completes the items of General Maintenance, which are placed in the box at the head of the columns, and foot up \$15,000. This amount is divided upon the machinery in proportion to the value of each operation. The percentage this bears to the total is set in Column 5, and the amount of the corresponding percentages in Column 6. This adds up the same amount as the sum in the box at the top, showing the work to be correct.

We next take the items chargeable to the Maintenance of Buildings, including the furnishings. These items of expense are made up of the due proportion of those which have just now been charged to Machinery, with the addition of Repairs in Material and Labor, an account which is supposed to have been kept. In the distribution of these items, first set down the approximate floor space occupied by each operation, next the estimated or known cost per square foot of construction, adding the accessories, automatic sprinklers, humidifiers, piping, wiring, etc. The cost of building will vary considerably, and some departments will have more or less furnishings than others. The Dye House will have a cost for piping, but no humidifiers, and the store house will have neither one, nor wiring for lights. The floor space is then multiplied by the total cost per square foot, and the products put down in Column 13. By the footing of this column, the total value of construction, etc., is found to be \$100,000. To the items charged at the head of the column, we now add one percent for depreciation, making a total of \$3,000. The percentage of this amount to each operation is then added in Column 14, and the actual charge, obtained by taking the percentage of \$3,000, is set in Column 15. This column is then footed to prove the work correct.

In the Repair Shops, a detailed account has been kept through the six months of the labor and material expended or used for each department and operation. (Total Labor \$1,094.56. Total Material \$1,074.88.) This cannot include the supervision of the work (\$273.64), so that at the end of the period, having ascertained the percentage which the whole bears to the hitherto recorded cost in

MACHINERY.						BUILDINGS.					
Taxes..... \$ 4,000 Insurance..... 700 Repairs Fire Protection..... 50 Watch..... 250 Depreciation 4%..... 10,000 \$15,000						Repairs { Material... \$ 120 { Labor..... 160 Taxes..... 1,500 Insurance..... 200 Fire Protection..... 100 Watch..... 100 Depreciation 1%..... 1,000 \$3,000					
Operation.	Description.	Price.	Total Cost.	Per Cent.	Distrib.	Sq. Feet Floor Surface.	Construction.	Automatic Sprinkler.	Humidifying.	Piping.	Wiring.
1	2	3	4	5	6	7	8	9	10	11	12
Picking.....	2 Openers with Feeders.....	\$1,000.00									
	3 Intermediates.....	800.00	\$6,800	2.720	408.00	4,000	1.20	.03			.01
	3 Finishers.....	800.00									
WastePicking	1 Waste Picker & Feeder.....	750	300	45.00		800	1.20	.03			.01
Carding and	44 Cards.....	675.00	37,380	14.952	2,242.80	8,200	.70	.03	.03		.01
Drawing.....	96 Del. Drawing.....	80.00									
Slubbers.....	6 Slubbers, 312 sp.....	13.50	4,212	1.685	252.75	1,500	.70	.03	.03		.01
Intermediates	8 Intermediates, 912 sp.....	9.50	8,714	3.486	522.90	2,500	.70	.03	.03		.01
Fly Frames.....	24 Fly Frames, 4,032 sp.....	6.75	27,216	10.886	1,632.96	7,500	.70	.03	.03		.01
Spinning.....	90 Frames, 21,600 sp.....	3.50	75,600	30.240	4,536.00	31,000	.70	.03	.04		.01
Spooling.....	10 Spoolers, 1,200 sp.....	3.25	3,900	1.500	234.00	2,600	.70	.03	.04		.01
Reeling.....	15 Reels.....	200.00	3,000	1.200	180.00	2,000	.70	.03	.04		.01
Warping.....	10 Warpers.....	325.00	3,250	1.300	195.00	3,500	.70	.03	.04		.01
Twisting.....	10 Frames, 1,600 sp.....	4.25	6,800	2.723	408.00	2,000	.70	.03	.04		.01
Dyeing Stock.	1 R. S. Dyeing Machine.....	1,100.00									
	1 Extractor.....	350.00	2,750	1.100	165.00	1,500	1.00	.03		.03	.01
	1 Drying Machine.....	1,200.00									
	1 Fan and Piping.....	100.00									
	Cotton Bins.....										
Dyeing Chain.	1 Boiling Box.....	650.00									
	1 Doubler.....	250.00									.01
	4 Scotch Tubs.....	250.00	3,150	1.260	189.00	2,000	1.00	.03		.03	
	1 Splitter.....	250.00									
	1 Set Dry Cans.....	1,000.00									.01
Beaming.....	1 Dry Splitter.....	150.00	550	.220	33.00	1,500	1.00	.03			
	4 Beaming Frames.....	100.00									
Dressing.....	2 Slashers.....	1,200.00									.01
	1 Size Tub.....	125.00	2,615	1.046	156.90	3,000	.70	.03		.04	
	6 Drawing Frames.....	15.00									
	Beam Storage.....										
Weaving.....	330 Plain Looms.....	65.00	21,450	8.580	1,287.00	16,000	.70	.03	.04		.01
	75 Drop Box Looms.....	120.00	9,000	3.600	540.00	4,000	.70	.03	.04		.01
Sewing.....	1 Sewing Rolling Mach.....		250	.100	15.00	200	1.05	.03			.01
Brushing.....	1 Shear & Brushing Mach.....		750	.300	45.00	200	1.05	.03			.01
Tentering.....	1 Sewing Machine.....	25.00									
	1 Tentering Frame.....	3,000.00	3,050	1.220	183.00	1,600	1.05	.04		.02	.01
	1 Size Tub.....	25.00									
Calendering.....	1 Calender.....		1,000	.400	60.00	300	1.05	.03		.02	.01
Folding.....	1 Folder.....		250	.100	15.00	200	1.05	.03			.01
Winding.....	1 Winding Machine.....		80	.032	4.80	100	1.05	.03			.01
Pressing and	Cloth Racks.....										
Packing.....	1 Power Press for Cloth.....		1,000	.400	60.00	3,000	1.05	.03			.01
	1 " " " Yarn.....		800	.320	48.00	500	1.05	.03			.01
Steam Plant.....	5 150 H. P. Boilers, &c.....	1,200.00									
	1 Feed Water Heater.....	300.00	9,600	3.840	576.00	4,000	1.20	.03		.03	.01
	2 Boiler Feed Pumps.....	400.00									
	1 Injector.....	100.00									
Power Plant and Shafting	1 Engine.....	12,550.00	13,200	5.280	792.00	3,000	1.20	.03		.03	.01
Light Plant.....	1 Condenser.....	650.00									
	2 50 K. W. Dynamos.....	450.00	1,100	.440	66.00	200	1.20	.03			.01
	1 Switchboard.....	200.00									
Repair Plant.	Lathes, &c.....		1,000	.400	60.00	1,000	1.20	.03		.01	.01
Humidifying.....	1 Pump, &c.....		783	.313	46.95	100	1.20	.03			
Cott'n Storage						10,000	.40	.03			
Goods and											
Yarn Storage						5,000	.40	.03			
			\$250,000	100.000	\$15,000.00	123,000					

TABLE M.

31

			REPAIR SHOPS		Storeroom Supplies	Supplies	LIGHT	HUMIDIFYING	STEAM AND POWER		TOTAL	
Total Cost	Per Cent	Distribution	Labor		Materials	Including Oil Belting Pickers Sticks Brooms Travelers Crayons Shuttles Strapping Packing	Roll Covering Card Clothing Bobbins Spools Harness & Reeds Lamps Carbons Starch Bands Wires	P. M. \$66.00 7.44 R. & S. 146.68 Labor 212.60 Power 385.74 \$318.36	P. M. \$46.95 3.69 R. & S. 28.30 Power 25.00 Labor 50.00 \$123.94	STEAM POWER		TOTAL
					Fuel \$7,000.00 Labor 646.93 Repairs 486.62 Main. Mach y 576.00 Main. Buildg. 114.27 \$8,373.30							
13	14	15	16	17	18	19	20	21	22	23	24	25
\$4,960	4.959	\$148.77	\$31.02	\$25.60	\$40.10	\$22.73	\$22.73	51	7.714	\$694.26	\$1,370.48	
992	992	29.76	2.40	4.68	3.80	5.05	5.05	3	.129	38.61	129.30	
6,314	6.312	189.36	23.00	18.26	60.42	283.16	62.10	67	9.571	861.99	3,751.89	
1,155	1.155	34.65	15.19	16.70	25.60	4.20	12.28	7	1.000	90.00	453.62	
1,925	1.925	57.75	25.30	31.10	60.40	36.50	20.46	13	1.857	167.13	925.20	
5,775	5.774	173.22	42.10	33.20	120.00	15.31	61.38	34	4.857	437.13	2,256.49	
					191.68							
24,180	24.173	725.19	237.60	181.58	324.00	275.90	253.69	314	44.857	4,087.13	10,812.85	
2,028	2.028	60.84	13.10	7.60	22.00	315.78	20.28	5	.714	64.26	741.76	
1,560	1.560	46.80	2.00	1.50	15.00	16.37	3.00	3	.429	38.61	303.28	
2,730	2.729	81.87	8.40	28.75	2.50	24.12	18.64	3	.429	38.61	413.14	
1,560	1.560	46.80	16.20	42.00	35.20	65.20	26.37	30	4.286	385.74	1,018.51	
1,605	1.605	48.15	50.20	35.50	47.10	1,809.10	10.27	5	.714	64.26	3,054.48	
										825.00		
2,140	2.140	64.20	40.20	20.00	28.70	810.00	13.37	5	.714	64.26	1,504.73	
										275.00		
1,560	1.560	46.80	1.10	2.60	4.20	12.27	12.27	1	.143	12.87	112.84	
2,280	2.279	68.37	12.00	15.30	107.10	736.23	24.55	6	.857	77.13	1,597.58	
										400.00		
12,480	12.478	374.28	343.13	300.10	205.60	133.12	149.40	82	11.714	1,054.26	3,870.95	
3,120	3.119	93.57	110.20	132.05	71.30	33.03	39.23	19	2.714	244.26	1,269.64	
218	.218	6.54			16.80	1.64	1.64	1	.143	12.87	52.85	
216	.216	6.48	3.50	18.40	2.20	1.64	1.64	3	.429	38.61	115.83	
1,792	1.792	53.76	25.60	22.00	24.20	450.00	13.09	5	.714	64.26	1,240.36	
										404.45		
333	.333	9.99	13.60	2.20	2.20	2.45	2.45	4	.571	51.39	141.83	
218	.218	6.54			.60	5.00	1.64	1/4	.036	3.24	32.03	
109	.109	3.27			1.00	280.00	.82	1/4	.036	3.24	293.13	
						Ch. 180.00						
						Pr. 112.00						
						Mad. 806.00						
3,270	3.269	98.07	3.50	1.25	3.20	25.10	24.55	1/4	.036	3.24	1,316.91	
545	.545	16.35			1.20	210.00	4.09	1/4	.036	3.21	282.88	
5,080	5.079	152.37	150.00	287.00	60.90							
3,810	3.809	114.27	160.00	75.00	250.62							
248	.248	7.44	18.00	2.50	32.18	91.00		30	4.286	385.74		
1,250	1.250	37.50			8.20			3	.429	40.00		
123	.123	3.69	11.50	8.60				2	.285	25.00		
4,300	4.299	128.97	6.94	4.20							139.41	
2,150	2.150	64.50	3.12	2.10							69.72	
100,036	100.001	\$3000.12	\$1368.20	\$1319.87	\$1576.82	\$6896.33	\$818.36	\$123.94	700	100,000	\$10,905.19	\$37,541.77

detail (25%), the same is added to the cost of repair labor expended on each operation in the mill. In this supervision is included also the labor on the repair department itself. These amounts are then entered in their proper place in the table (Column 16) amounting to \$1,368.20.

There is also an unaccounted-for balance of charges (\$107.49) for material, but before this is distributed there may be added a charge of \$40.00 for power. This is estimated and will be deducted from Power account before distributing, later.

By the portion of the table already constructed, we find the cost of Maintenance of the Repair Plant to be \$60.00 for Machinery, and \$37.50 for Buildings, etc. These three items, with the unaccounted-for balance of Repair account, are then added to the detailed materials cost, on a percentage basis, in the same manner as the general labor, and the amounts set down in Column 17. These amount to \$1319.87, and prove the work correct.

From the Storeroom there have been delivered miscellaneous supplies, oil, brooms, crayons, loom strapping, pickers, picker sticks, shuttles, travelers, packing, etc. An account of these has been kept, and the value delivered to each department entered in Column 18.

In addition to these lighter supplies from the Storeroom, a large amount of money has been spent in paying bills for supplies of a heavier nature, such as card clothing, bobbins, spools, harnesses, roll covering, starch, and the like. In the column in which these are also included some items especially applied to particular classes of costs, may be disposed of, such as packing cases, bands, burlaps, cloth boards, cones, etc., with a notation of the amount. The amount of all the items chargeable to each department or operation, may perhaps be most easily ascertained by an inspection at the end of the period of the bills charged to this account.

In Column 20 are the expenses of Lighting (\$818.36) as summarized in the box at the head of the column. The items include Maintenance of Machinery \$66.00, and Buildings \$7.44, as taken from Columns 6 and 15 of this table. Repairs and Supplies from Columns 16, 17, 18 and 19 amounting to \$146.68, and the cost of Power as later ascertained \$385.74 and Labor \$212.50 from the division of general Labor, already given. This cost is divided

among the departments in proportion to the light or current used, omitting the Power and Repair departments, as these cannot be closed and divided up, until after all items have been determined. On the other hand the cost of Lighting cannot be settled until the expense of Repairs and Power has been ascertained. As the costs of these latter are more important than the former, the lighting of Repairs and Power Departments is passed over.

The cost of Humidifying is determined and distributed in a similar way. It will be noticed that this expense applies to but a portion of the mill.

The costs of Power and Steam are next worked up. As a considerable amount of the steam generated at this plant is used for dyeing, drying, warp dressing, and finishing, a separation is made between the Boiler and Engine Installations, and with the cost of running the latter is included the care and maintenance of shafting.

The cost of Steam is made up of Fuel \$7,000.00, Labor \$646.93 (both taken from the records). The Repairs and Supplies as taken from this table amount to \$498.00, and the Maintenance of Machinery \$576.00, and Buildings \$152.37. Of the total \$8,873.30 thus obtained, estimated amounts are apportioned in Column 24, to Dyeing, Dressing and Finishing, to cover the cost of these processes.

The remainder of the cost of Steam is added to the cost of Labor \$640.00, Repairs, etc., \$485.62 and Maintenance of Machinery \$792.00, also Buildings \$114.27, applicable to the Power Plant.

In Column 22 is set down the estimated average power consumed in each operation. The total is 700 horse power. The percentage of each operation is extended in Column 23. The total cost of Power, including the balance of Fuel is then divided according to the percentage of power used and carried out into Column 24. This column, including the amounts already allotted for Steam, will now foot up to the sum of cost of Steam and Power, \$10,905.19.

Excluding Steam, Power, Lights, Repairs, and Humidifying, which have been redistributed, the General Expense of Maintenance, Supplies, Power, etc., are then added across the page, horizontally and enumerated in Column 25.

We have now the means of uniting the Labor Cost with that of Maintenance, Supplies and Power, hereafter abbreviated to M.S.

and P., for the same departments, and dividing the combined amounts among the various kinds of product. This is accomplished in a series of forms such as follow:

Semi-Annual Cost Sheet, Card Room.

Total lbs. carded stock in Yarns and Cloth made.									
No. of Hank or Roving.....	Total.	1.	1.50	5.20	6.00				
Total lbs. carded stock in Yarns and Cloth made.		70,000	30,000	600,000	100,000				
Add Inventory Dec. 29.....		6,100	900	58,800	3,300				
Deduct Inventory June 30.....		76,100	30,900	658,800	103,300				
	814,400	76,100	30,900	604,100	103,300				
		Total.	Per lb.	Total.	Per lb.	Total.	Per lb.	Total.	Per lb.
Labor Costs, corrected.....	\$8,263.36	\$348.16	.....	\$155.68	.....	\$6,536.36	.....	\$1,223.16	.....
Picking, Maintenance, Sup. and Pow.....	1,370.48	128.14	.....	52.21	.....	1,015.89	.....	174.24	.....
Waste Picking, Maintenance, Sup. and Pow.....	129.30	91.90	.....	37.40	.....			
Carding, Maintenance, Sup. and Pow.....	3,751.89	350.39	.....	142.36	.....	2,783.24	.....	475.90	.....
Subbers, Maintenance, Sup. and Pow.....	453.62	42.39	.....	17.21	.....	336.48	.....	57.00	.....
Intermediate, Maintenance, Sup. and Pow.....	925.29					790.37		134.92	
Fly Frames, maintenance, Sup. and Pow.....	2,526.49					2,157.60		368.89	
	\$17,420.43	960.98	1.263c	\$404.86	1.310c	\$13,619.94	2.254c	\$2,434.65	2.557c

As a basis of division of cost, at the top of the form are given the pounds of roving contained in the finished product of the mills, and this is then corrected to the amount passed through the card room, by adding the inventory at the end of the period and deducting that at the beginning. The corrected labor costs are then inserted.

The total cost of M.S. and P. of Picking is then entered from Table M, and divided according to the pounds of each hank roving made. The M.S. and P. of Waste Picking is entered and divided among the two rovings containing waste. The M.S. and P. of the various processes of roving frames are then taken separately, and divided according to the spindles occupied on each roving. By this

means the cost of 1. hank roving in the department of carding is found to be 1.263 cents per pound.

1.50 hank roving....	1.310
5.20 " ".....	2.254
6. " ".....	2.357

By a similar method, the tabular forms for the Spinning Room, Spooling Room, Reeling Room, Warping Room, Twisting Room, Raw Stock Dyeing, Chain Dyeing, Beaming Room, Dressing Room, Weaving Room, Finishing Room and Storage are entered up and figured out.

Semi-Annual Cost Sheet, Spinning Room.

No. of Yarn.		No. 8.	No. 12.	No. 25
Average Spindles run,....	21,000	500	310	6,133
Lbs. Spinning in Cloth and Yarn.....	800,000	70,000	30,000	240,300
Add Inventory Dec. 29.....	24,300	4,900	100	18,500
	824,300	74,900	30,100	258,500
Deduct " June 30....	8,900			
	815,400	74,900	30,100	258,500
Labor Costs, corrected	\$ 6,999.90	\$214.70 .300c	\$195.65 .650c	\$2,197.25 .850c
Maintenance, Sup. and Pow.....	10,812.85	257.43 .330	159.61 .530	3,157.63 1.223
	\$17,812.75	\$472.13 .630c	\$355.26 1.180c	\$5,354.88 2.073c

No. of Yarn.		No. 28.	No. 32.	No. 36.
Average Spindles run.....		8,126	3,400	2,531
Lbs. Spinning in Cloth and Yarn.....		289,600	100,000	70,400
Add Inventory Dec. 29.....			800	
		289,600	100,800	70,400
Deduct " June 30.....		8,100		800
		281,500	105,000	69,600
Labor Costs, corrected.....	\$2,533.50 .900c	\$1,058.40 1.050c	\$ 800.40 1.150c	
Maintenance, Sup. and Pow.....	4,184.45 1.487	1,750.52 1.737	1,303.21 1.872	
	\$6,717.95 2.387c	\$2,808.92 2.787c	\$2,103.61 3.022c	

Semi-Annual Cost Sheet, Spooling Room.

No. of Yarn.....		8	25	28
Average No. Spindles run.....		50	600	350
Pounds spooled yarn in cloth and yarn...	479,600	70,000	240,000	169,600
Add Inventory Dec. 29.....	44,500	4,700	25,500	14,800
	524,100	74,700	265,500	183,900
Less Inventory June 30.....	28,500		5,000	23,500
	495,600	74,700	260,500	
Labor cost, corrected	\$ 1,775.63	\$ 112.05 .15 c	\$ 989.90 .380c	\$ 673.68 .420c
Maintenance, supplies and power.....	741.76	37.09 .049	445.05 .171	259.62 .162
	\$ 2,517.39	\$ 149.14 .199c	\$1,434.95 .551c	\$ 933.30 .582c

Semi-Annual Cost Sheet, Reeling Room.

No. of Yarn.....			28	28
Average reels run....			12	3
Pounds reeled yarn, in yarn sold.....			120,900	80,000
Add Inventory Dec. 29.....			900	800
			120,000	80,800
Deduct Inventory June 30.....			1,000	500
			119,000	80,300
Labor Costs, cor- rected.....	\$ 876.64	\$575.52	.480c	\$301.12 .375c
Maintenance, Sup- plies and Power....	303.28	242.62	.202	60.66 .075
	\$1,179.92	\$818.14	.682c	\$361.78 .450c

Semi-Annual Cost Sheet, Warping Room.

No. of Yarn.....		8	25	28
No. of Machines run.....		5	5	1.5
Ponnds Warped Yarn in Cloth and Yarn.....		70,000	240,000	89,600
Add Inventory Dec. 29.....		3,700	22,500	10,500
		73,700	262,500	100,100
Deduct Inventory June 30....				20,000
		73,700	262,500	80,100
Labor Costs, corrected.....	\$1,097.24	\$92.12	.125c	\$708.75 .270c
Maintenance, Supplies and Power	413.14	29.51	.040	295.10 .112
	\$1,510.38	\$121.63	.165c	\$1,003.85 .382c
				\$384.90 .480c

Semi-Annual Cost Sheet, Twisting Room.

No. of Yarn.....				2128
No. of Spindles ran.....				
Pounds Twisted Yarn, in yarn sold.....				80,000
Add Inventory Dec. 29.....				800
				80,800
Deduct Inventory June 30.....				500
				80,300
Labor Cost, corrected.....				\$ 521.95 .650c
Maintenance, Supplies and Power.....				1,018.51 1.238
				\$1,540.46 1.918c

Semi-Annual Cost Sheet, Raw Stock Dyeing.

Pounds cotton dyed in raw stock in cloth made.....				298,500
Add Inventory Dec. 29.....				23,500
				322,000
Labor cost, corrected.....				\$ 644.00 .200c
Maintenance, Sup- plies and power....				3,054.48 .948
				\$3,698.48 1.148c

Semi-Annual Cost Sheet, Chain Dyeing.

Pounds of dyed stock in cloth made.....	67,000
Add Inventory Dec. 29.....	10,700
	<u>77,700</u>
Labor Cost.....	\$ 293.10
Maintenance, Supplies, Power.....	1,504.73
	<u>\$1,797.83</u>

$$\$1,797.83 \div 77,700 = 2.314c \text{ per lb. cost.}$$

Semi-Annual Cost Sheet, Beaming.

Pounds of Beamed Yarn in Cloth Made.....	75,000
Add Inventory Dec. 29.....	8,700
	<u>83,700</u>
Labor Cost.....	\$669.60
Maintenance, Supplies, Power.....	112.84
	<u>\$782.44</u>

$$\begin{aligned}
 \$669.60 \div 83,700 &= .800 \text{ per lb. Cost Labor.} \\
 112.84 \div 83,700 &= .135 \quad \quad \quad \text{M., S. and P.} \\
 \$782.44 \div 83,700 &= .935c \text{ Total Cost per lb.}
 \end{aligned}$$

Semi-Annual Cost Sheet, Dressroom.

No. Slashes run.....				
Kind of Warp.....	Total.	Cheviot.	Madras.	Print.
Pounds dressed yarn in cloth made.....		70,000	150,000	89,600
Add Inventory Dec. 29.....		2,500	17,000	9,000
		72,500	167,000	98,600
Deduct Inventory June 30....				18,000
		72,500	167,000	80,600
Labor cost.....	\$1,685.83	\$253.75 .350c	\$1,085.50 .650c	\$346.58 .430c
Maintenance, Supplies, Power	1,597.58	273.25 .377	948.11 .568	376.23 .460
	<u>\$3,283.41</u>	<u>\$527.00 .727c</u>	<u>\$2,033.61 1.218c</u>	<u>\$722.80 .890c</u>

Semi-Annual Cost Sheet, Weave Room.

Kind of Goods....	Total	Cheviot	Print	Madras	Check Madras
No. of Looms run.....	27	153	150	75	
Pounds of Cloth woven.....	100,000	160,000	170,000	80,000	
Labor Cost, corrected.....	\$15,860.00	\$1,380.00 1.380c	\$4,880.00 3.050c	\$6,120.00 3.600c	\$3,480.00 4.350c
M. S. & P. Plain looms.....	3,870.95	316.71 .318	1,794.69 1.122	1,759.55 1.030	
M. S. & P. Check looms.....	1,269.64				1,269.64 1.587
	<u>\$21,000.59</u>	<u>\$1,696.71 1.698c</u>	<u>\$6,674.69 4.172c</u>	<u>\$7,879.55 4.635c</u>	<u>\$4,749.64 5.937c</u>

Semi-Annual Cost Sheet, Finishing Room.

Kind of Goods....	Total.	Yarn.	Cheviot.	Print.	Madras.
No. of Pounds....	\$10,000	300,000	100,000	160,000	250,000
No. of Yards.....			215,000	1,120,000	1,500,000
Labor Cost.....	\$2,090.00	\$600.00	\$150.00	\$240.00	\$1,100.00
Sewing, Main., Sup. and Power	52.85	.....	4.00	22.00	26.85
Brushing, Main., Sup. and Power	115.83	.....	8.40	46.20	61.23
Tentering, Main., Sup. and Power	1,240.36	.....	.....	.....	1,240.36
Calendering, M'n., Sup. and Power	141.83	.....	.....	60.48	81.35
Folding, Main., Sup. and Power	32.02	.....	.....	13.80	18.22
Winding, Main., Sup. and Power	293.13	.....	.....	.....	293.13
Cloth Pressing, Main., Sup. and Power.....	1,316.91	.....	225.11	173.00	918.80
Yarn Pressing, Main., Sup. and Power.....	282.88	282.88	.....	.....	.....
	\$5,565.81	\$882.88 .294c	\$387.51 .388c	\$555.48 .347c	\$3,739.94 1.496c

Semi-Annual Cost Sheet, Storage.

Kind of Goods Stored.....	Cotton.	Cheviot.	Madras.	Skein Y'rn	Total.
Percentage of Space Used.....	100%	20%	60%	20%	
Pounds Stored.....					
Cotton Warehouse	\$139.41	.....	.....	.....	.....
Goods " "	.....	\$13.95	\$41.83	\$13.95	\$69.73
Cost per pound Finished Goods:	.018c	.014c	.017c	.005c	

It is unnecessary to follow in detail all the calculations of these forms. Concerning the distribution of M.S. and P. it should be understood that as a rule it is to be divided according to the proportion of machinery run, rather than the pounds produced. For example, in the Spinning Room, one thousand spindles will require about the same floor space, oil, and power whether run on No. 8 yarn or on No. 36 yarn, but the production in pounds will be far different. It is, therefore, contrary to good reasoning, to divide this expense on the basis of so much a pound, but rather should it be on so much a spindle, and the pound cost will take care of itself. The force of this is seen again, in the Weave Room, where the madras is divided into two portions: that woven on plain looms, and that woven on drop box looms—with a decided increase in cost of the

latter—and again in the contrast of the cost of the cheviot and print cloth.

The last expression of the Cost is made on the Assembling Sheets, of which we may conveniently make two, one for yarn and one for cloth. As the name implies the departmental costs are here assembled under proper headings to obtain the full gross costs of manufacturing.

Assembling Sheet Yarn.

Number	25 Warp	28 Skein	$\frac{2}{3}$ Skein
Carding	2.254c	2.254c	2.254c
Spinning	2.073	2.387	2.387
Spooling .....	.551	.582	.....
Warping .....	.382	.....	.....
Twisting .....	.....	.....	1.918
Reeling .....	.....	.682	.450
Finishing .....	.294	.294	.294
Storage, Yarn .....	.....	.005	.005
Storage, Cotton .....	.018	.018	.018
General Expense and Interest	5.572 .598	6.222 .672	7.326 .832
Cotton	9.342	9.342	9.342
	15.512	16.236	17.500
Freight .....	.252	.330	.336
Commission	1.600	1.680	1.760
Total Cost Yarns	17.364	18.246	19.901

Taking the case first of No. 25 warp yarn; we find this to be made from 5.20 hank roving, and the department cost of carding this, from the Semi-Annual Cost Sheet, is found to be 2.254, which is set down in the proper space. The other sale yarns are also made from the same size roving, and are similarly entered.

From the Spinning Room Cost Sheet we find the cost of spinning No. 25 yarn to be 2.073 cents, now to be entered below the carding.

After the same manner we obtain and enter the costs of Spooling, Warping and Finishing. We omit Twisting and Reeling as having no part in the cost of single warp. We omit also Storage of Yarn as this yarn was shipped promptly upon being packed. The storage of cotton, however, is a part of the cost, and is included.

Following the same steps with all the yarns, we find the sum of the costs, thus far attained, to be

No. 25 Yarn.....	5.572 cts.
No. 28 Skein Yarn	6.222 "
No. $\frac{2}{28}$ " "	7.326 "

These figures include all the costs of manufacturing proper except the stock, and certain general expenses which are not assignable to any department, nor can they be divided among the products by any system by which it is possible to say: "We know that so much money was expended for Salaries, Postage, or Cleaning up the Yard, and the expense is directly caused by such a kind of goods or yarn, and chargeable to it."

These unassignable expenses as shown by the mills accounts, are

Salaries and Office Expense.....	\$4,000.00
Miscellaneous Expense.....	500.00
Yards	600.00
Interest.....	3,600.00
	<hr/>
	\$8,700.00

This sum is found to be $11\frac{1}{3}\%$ of the amount of other expenses, excluding cotton and yarn purchased, and is divided among the products on this percentage plan. It may fairly be assumed that those departments having a higher labor cost and using more supplies, will call for more supervision, more correspondence and office expense, more general labor and money borrowed. Charges of interest on money used in the purchase and carrying of cotton, may previously be calculated and added to Cotton account, or the cost of interest on funds invested in cotton and finished goods may be added to the Semi-Annual Storage Report, if thought more convenient.

This percentage of general expense should be added before the inclusion of the cost of stock, since the latter bears no relation to it and, varying from season to season, would vary the proportion of expense to each product without good reason.

We have already found the cost of stock used in all yarns sold to be 9.342 cents, and having added this to the previously ascertained cost, the full manufacturing cost, with the exception of the important one of profits, is completed.

As the purpose of all manufacturing is gain, and the utility of cost investigation lies in showing where, and how much of that gain

has resulted or will result, profits may be considered legitimately an element of cost. It is often easier to determine what it ought to be, than to obtain it under adverse market conditions, and it is occasionally obtainable to a greater degree than is necessary for an average return on capital invested. The return on capital investment, however, is the only basis, when considered as a *cost*. If there is no wide variation in product, such as would be the case if the yarns already considered were the only product, the necessary profit might be reckoned from the production per spindle of each kind of yarn, but in such a combination of departments and processes as arise in a spinning and weaving mill, a better rule is to calculate the gross profit desired, and add the necessary percentage to the costs, again excluding the stock used.

The cost of the stock used should be omitted because it is such a variable element. Depending upon conditions of the crop and markets, it may vary fifty per cent in price, while the margin necessary for fair returns would be unchanged. Of two kinds of goods having a very different cost of stock, the one costing more might, on account of greater production per unit of loom or spindle, require less margin of profit than the other.

The Manufacturing Costs having now all been obtained, the additional expense of marketing and distributing goods must be had. These include Freight, paid on goods shipped, Commissions, for selling, and sometimes Advertising, Traveling Expense, and other items.

In these tables the net Commissions are added as a percentage, varying according to the contract with the selling house, or with trade custom. The estimated amount which will have to be paid for freight is added. It must be borne in mind that these items are based on the actual cost per yard or pound of the product under estimate.

Unlike other factors this cost per pound cannot be taken from the net expense incurred during the periods. It is quite usual for goods to be stored in large quantities, so that the expense of distributing is a very variable one, so far as amount of charges in any length of period is concerned.

Goods which it took most of the time for six or nine months to manufacture, may be stored and then cleared out in one or two

months, and all the charges for selling and shipping, concentrated in a short time.

ASSEMBLING SHEET, CLOTH.

	Cheviot		Print Cloth		Madras	
	Warp No. 8 No. 1 h. r.		Warp No. 28, No. 5. 20 h. r.		Warp No. 25, No. 5. 20 h. r.	
	Fill No. 12, 1.50 "		Fill No. 36, 5.20 "		Fill No. 32, 6.00 "	
	Yards, per lb., 2.15		Yards, per lb. 7.00		Yards, per lb. 6.00	
	Cost per pound	Per cent used	Cost per pound	Per cent used	Cost per pound	Per cent used
Labor Cost, corrected						
Carding warp	1.263	70	.884	56	1.262	56.8
Carding filling	1.310	30	.393	44	.992	40.7
Spinning warp	.630	70	.441	56	1.337	56.8
Spinning filling	1.180	30	.354	44	1.330	40
Spooling warp	.199	70	.159	56	.326	56.8
Warping	.165	70	.106	56	.269	56.8
Beaming					.985	30
Raw Stock Dyeing	1.148	100	1.148		1.148	70
Chain Dyeing					2.314	25.8
Dressing	.727	70	.509	56	1.218	60
Weaving			1.698		4.172	
Finishing			.388		.347	
Storage, Cotton			.018		.018	
Storage Goods			.014			
Total Mill Expense			6.112		10.555	
General Expense and Interest 11½ %			.693		1.203	
			6.805		11.758	
Cotton			6.693		9.342	
Yarn						
			13.498		21.100	
Freight			.560		.210	
Commissions			.850		.350	
			14.908		21.690	

The above cost of Madras is for 170,000 lbs. woven on plain looms. The 80,000 lbs. woven on drop box looms cost (per Weave Room Cost Sheet) 5.937 cents per pound for weaving instead of 4.635 cents as above. The total cost of manufacturing the check goods was therefore 28.490 cents per pound instead of 24.968 cents.

In the assembling sheet for woven goods, we have a similar work to that on yarns, with additional elements. The Cheviot is made of 70% warp and 30% filling, made from different rovings, and therefore having different card room costs. The warp carding 1.263 cents per lb., and each pound of cloth contained 70% warp. The cost per pound of cloth for carding warp, was therefore, 70% of 1.263 cts., or .884 ct. per lb. The cost per pound of cloth for carding filling is 30% of 1.310 cts., the cost of the filling. For convenience these assembling sheets for cloth are provided with separate columns for each of these three items, and each process is entered up for the extent to which it enters into the make-up of the fabric. There is no division of the cost of weaving and subsequent operations.

In the cost of warp for Madras it will be noted that only 56.8% of the cloth is carded and spun for warp. The filling is 40% of the cloth. The balance, 3.2%, is the yarn purchased which did not pass through the carding and spinning in the Enterprise Mills, and therefore is eliminated from the labor costs of those departments.

Only one half of the warp is beamed, the other half being warped from yarn spun from bleached cotton. One half the warp makes 30% of the cloth.

The yarn purchased was dyed previously, and amounted to 3.2% of the cloth. As already stated 60% of the Madras was warp. One half of this, or 30% of the cloth, less 3.2% purchased, equal to 26.8% of the cloth, was dyed by the long chain system. The balance or 70% was dyed in raw stock.

The addition of General Expense, etc., is also on the same plan, as with the cost of yarn, and also the cost of Stock, excepting that in the Madras the item of the additional cost of the yarn purchased solely for these goods. Deducting the value of the inventory of yarn the amount used was equal to .800 cent per pound.

There were also two kinds of Madras, one woven on plain looms, and one on drop box looms, but alike in all other respects, and having the same cost except for weaving.

Having summed up the Manufacturing Costs, we may add Freight and Commissions. These differ from the Manufacturing Cost items in that they should equal the expense that has been, or will be incurred in the distribution of the goods, whether it has already been paid out or not.

The total costs per pound for cloth, less margin for profit, are:

Cheviot.....	14.908	cts. per lb.
Print Cloth.....	21.690	" " "
Madras, plain looms.....	27.188	" " "
Madras, drop box looms....	28.490	" " "

As 170,000 lbs. of Madras were woven on plain looms, and 80,000 lbs. on check looms, but were all sold at the same price, we are interested to find the average price of Madras:

$$(27.188 \text{ cts.} \times 170,000) + (28.490 \times 80,000) \div 250,000 = 27.604 \text{ cts. per lb.}$$

The cost per yard may be obtained from the cost per pound by dividing by the yards per pound, as follows:

Cheviot	$14.908 \div (2.15 + 2\%) = 2.193$	= 6.80 cts. per yard.
Print Cloth	$21.690 \div 7 = 3.10$	cts. per yard.
Madras	$27.604 \div 6 = 4.60$	cts. per yard.

These yards per pound are the figures obtained by dividing the pounds from the loom by the finished yards. And 2% is added to the cheviot because 2% has been gained in weight in process through the mill above the original proportion of stock, as previously noted.

The computations have been long, complicated and laborious, and it is well to prove the substantial accuracy of the mathematical work, which may be done as follows:

100,000 lbs.	No. 25 Warp at	15.512	cts. per lb . . .	\$15,512.00
120,000 "	" 28 Skein "	16.236	" " " . . .	19,483.00
80,000 "	" $\frac{2}{24}$ " "	17.500	" " " . . .	14,000.00
100,000 "	" Cheviot "	13.498	" " " . . .	13,498.00
160,000 "	" Print Cloth	21.100	" " " . . .	33,760.00
170,000 "	" Stripe Madr.	24.968	" " " . . .	42,445.60
80,000 "	" Check Madr.	26.270	" " " . . .	21,016.00
				<hr/>
				\$159,714.60
Additional value Labor, and M. S. & P., inventory of stock in process.....				1,439.19
				<hr/>
Total Cost of Products, as computed.....				\$161,153.79
				<hr/>
Total Value, Mfg Labor, from semi-annual cost sheets				\$40,777.25
" "	Repairs, Labor, Material, Taxes, etc., see			
page 28				35,241.65
Depreciation allowed.....				11,000.00
Cotton, less increased inventory, see page 24.....				65,396.39
Waste, " " " " " 24.....				6,693.05
Yarn, " " " " "				2,000.00
				<hr/>
Total Expenses Manufacturing.....				\$161,108.34

The manager of the Enterprise Mills, having devised in outline the method above described, had it carried into effect, at the end of the half year. He discovered, however, that the bookkeeper, though efficient, was not sufficiently informed upon the mill work and processes to carry out the scheme, without his own personal, strict supervision, and that on the other hand the clerical work was far too great for him to do alone.

One afternoon he called the superintendent and showed him the results, and asked him what he thought of them.

"Well!" was the reply, "I reckon they are all right, but it seems to be a mighty lot of work."

"Yes," replied the manager, "it is. But I think in our condition it is worth it. I would not bother with such fine points if we were making only a few yarns, as we began. But I want now, not an *estimate* of what goods have cost, but a *computation*. And while this method is not perfect, and we may yet improve it, no one can say that we have not considered practically all the items of cost in

a rational way. Moreover, it has proved an "eye-opener" to me in many ways. We strive to keep down the labor costs, and rightly, and think the card room pay-roll a heavy one, but do you realize that the Depreciation, Maintenance, Supplies and Power cost equally as much. Spinning Room labor cost is considerable, but its Maintenance, Supplies and Power are half as much again. In the light of these facts, how important it is to obtain and maintain the highest efficiency and *production* of our machinery and help.

"We direct our energies to keep down the cost of supplies for the weave room, but their importance dwarfs in comparison with a ten per cent increase in the spinning room production, and, if this new method teaches us something of true values, it will not be in vain."

THE MAIL-ORDER BUSINESS

Without question, the so-called "mail-order business" has developed more rapidly and to a greater extent within the last twenty years than any other line of trade. The improvement of the postal system and the instituting of the rural free delivery has enabled the customer in far away places to deal with the city houses and receive prompt and satisfactory service.

When the practice of selling things through the mails began, a comparatively few years ago, those who adopted this means to dispose of their wares became known as *mail-order dealers*, and the business, as the *mail-order business*, and these terms are still used, although the business has developed to such an extent that they are really misnomers.

In the early days of the trade, the goods sold were principally cheap novelties, games, tricks, recipes and formulae, fake jewelry, fortune-telling books, "get-rich-quick schemes," sensational literature, and other things that were made especially to sell in this manner. As all of those who were engaged in the business at that time were practically in the same field, it was quite proper to call them mail-order dealers, but as the entire character of the business has changed or, rather, another branch of it has proven to be the successful branch, the name *mail-order dealer* should still be confined to this class of itinerant advertiser, and some other name substituted for the very large number of firms who are engaged in selling goods "by catalogue."

It was supposed to be impossible to sell goods to the consumer without being in actual contact with him, or to the dealer without the aid of a traveling representative, until some optimistic merchant made up his mind that goods could be sold by correspondence, and that the public, if fairly treated, would become permanent customers of the house. Montgomery Ward & Company of Chicago were the first to enter this field in a broad way, and now it is estimated that the expenditures of this firm and that of Sears, Roebuck, & Com-

pany for catalogues and other printed matter must come to several million dollars per year, while the cost to many smaller concerns throughout the country reaches an annual sum of several hundred thousand dollars each.

Catalogue Distribution. Where such large amounts of money are expended upon printed matter, it naturally follows that the greatest care must be exercised to distribute it properly among possible buyers, and eliminate the curiosity seeker. It is not the custom of large houses to mail expensive printed matter promiscuously. They generally issue what is known as a preliminary letter or folder in answer to the first inquiry received from the advertising. This document calls the attention of the person who answers to their line of business, prices and service to be rendered by the advertiser, and with it there is inclosed a mailing card which is to be used by the person receiving it to send for a catalogue, providing the person is interested enough to write for one. As large firms like Montgomery Ward & Company issue over sixty different classes of catalogues, it is also very desirable to learn from the customer, if possible, before any one of them is sent, the particular class of goods in which he is most interested. If an inquirer is most interested in furniture, he will be sent the "furniture catalogue"; if he is most interested in musical instruments, he will be sent the "musical catalogue"; if he appears to be a general buyer, he will receive a large general catalogue, which, in some instances, contains several hundred pages and requires thirty cents or more postage to deliver. Some houses ask the public to bear the expense of postage, which is not an unreasonable demand, inasmuch as they are never asked to bear any other portion of the catalogue expense.

Catalogue Dealers. The entire basis of this business is the catalogue which gives to the customer a full description of the goods offered for sale, accompanied in most cases by illustrations more or less accurate, and the prices for which these goods are to be sold in plain figures. It would, therefore, not be amiss to call this class of business the *catalogue business* instead of the *mail-order business*, and the dealers *catalogue merchants* instead of *mail-order dealers*. Nowadays, practically everything under the sun is sold in this manner. Medicines and dry goods, post cards and pianos, laces and automobiles, machinery and sash-doors and blinds, music and furniture,

neckties and farm machinery are all sold through the mail, and yet one would not know in what business in any of these lines a man was engaged merely by the term a *mail-order dealer*.

A man who sells pianos by mail should be considered a *catalogue piano dealer* rather than a *mail-order man*. A business of the nature of Sears, Roebuck, & Company or Montgomery Ward & Company would be termed a *catalogue general merchandise business*. If this were done, the term *mail-order man* would still apply to the small itinerant vender.

Progress of the Business. The possibilities of doing business by mail are practically limitless. There is, probably, no branch of business which to-day gives an ambitious young man with any degree of selling shrewdness a better chance to succeed than does this branch of trade. Many who have started with practically no capital at all have grown to be rich men. The success of these young men was due to the evolving of some new idea which they had the ability to place forcibly before the public, and the good business sense to select the right channels for their wares, as well as the proper advertising medium for the exploitation.

It is said that Mr. Sears, the founder of Sears, Roebuck, & Company, started in business on a very small capital, in two rooms in a Chicago office building. Mr. Sears evolved the idea that watches could be sold to farmers much more cheaply and satisfactorily than they could buy them from their nearest jeweler. He began, therefore, on watches alone, and in ten years has established a business of such enormous proportions that it has been capitalized for millions of dollars and taken hold of by Wall Street bankers. The merchandising business of this firm in 1908 exceeded \$42,000,000, and in 1911 over \$65,500,000. Subsequent years have shown corresponding increases.

The Principles of the Catalogue Business. There are certain established principles which make for success in this business as in any other, and they may be laid down tersely as follows:

- (1) Ability to buy the proper goods at the lowest figure.
- (2) Cataloguing the goods offered for sale in a manner that will attract the attention and gain the confidence of the buyer.
- (3) Ability to price the goods as low as possible in order to net a fair profit.

- (4) Wisdom and discretion in advertising.
- (5) Dealing absolutely fairly with all customers, and refunding the amounts paid together with the charges paid by the customer, in case of dissatisfaction *from any cause whatever*.
- (6) And most difficult of all, the ability to keep a constant stock of every variety of everything which is catalogued or may be called for.
- (7) Never to vary from the promises made in the catalogue, never to send out cheaper goods, never to substitute.

Getting Orders. The problem of a proper catalogue distribution is much more easily solved than getting orders. It is thus absolutely necessary to procure the right kind of literature, and back it up with an effective follow-up system, either in the form of circular letters or supplementary folders. A very large amount of expense is put upon the make-up of catalogues and circulars. It is not necessary to have an elaborate introduction, as the public are more interested in what the dealer has to sell than in a history of his business.

Merchandise should be classified in such a manner that goods of different characters will be found under proper headings, and it has been proven that the use of illustrations is very necessary, as the eye can frequently appreciate the value of an article much more quickly than the mind can grasp it through the printed description. However, this description is necessary in order to make the impression conveyed by the illustration permanent.

The most important feature of the catalogue is the prices. Price is the magnet which draws the orders from the customers, and puts the money for the same in the merchant's bank account. Prices must be reasonable or the trade will go to competitors, for there are as many competitors in this line at the present time as in any other class of business. The mail-order man depends rather upon volume than large profits. If a very large trade can be worked up upon small profits, it leads to success, when large profits on a less amount of business might result in failure.

Advertising. The matter of writing mail-order copy and selecting proper mediums is of the utmost importance. Not much can be said in regard to copy—that is the question which must be decided by the nature of the business being advertised. One rule

however, is imperative and will be bound to produce the best results, and that is "the simpler the English used, the more forceful will be the argument." The nature of the article sold indicates the class of papers or magazines in which it is most suitable to advertise. A merchant would be wasting money to advertise a riding plow in the *Ladies' Home Journal*, or the latest style spring hats in the *American Agriculturist*. There is a class of papers and magazines published at a very low subscription rate which circulate most largely in the rural districts, and are read principally by women. These media would be suitable for some article of home use or women's attire of moderate price, suitable for country use, but if the article is a high-priced one, the advertiser should confine his expenditures to the periodicals read by the wealthier class of women. It is not necessary to confine the selection of advertising mediums to publications whose circulation is largely in the country. A great many have the mistaken idea that the purchasing of goods by mail is confined to farmers, their wives and families, or to the people of small towns, but such is not the case; residents of large cities are rapidly acquiring the habit of buying goods from catalogues on account of its convenience.

Advertising should be confined to papers and magazines of proved circulation. Claimed circulation is not sufficient, and one hundred thousand readers usually means a circulation of less than ten thousand. If you advertise only in mediums of proved circulation and fail to develop business, the fault lies not with the publication but in your proposition, or your methods of exploiting it.

Cash and Credit. The largest and most profitable mail-order houses in the world have been built up strictly on the cash basis, but, during recent years, there has entered into the field a number of catalogue houses that depend upon the giving of credit as one of the principal inducements in the sale of goods. The Larkin Company of Buffalo, New York, started in the soap business and made the innovation of selling \$10.00 worth of goods to the customer direct on credit, not to be paid for until used, and, with these goods, giving a premium which represented a considerable part of the profit. As the price offered was no higher than it was necessary to pay at home, with the inducement of a considerable gain in the way of a gift, as well as time in which to pay for the order, the farmers and small-town citizens all over the country became customers of the Larkin Com-

pany. As this business evolved, the Larkin Company added to their soap business other merchandise, mostly for home consumption, until now almost anything needed can be purchased upon this plan.

This firm is now selling such merchandise as teas, coffee, soaps, spices, toilet articles and drugs by the *club* plan. By this plan, a club is formed, of which each member agrees to buy a certain amount of goods in a certain time, each receiving a premium, with a special premium for the person who gets up and conducts the club. This method of selling has proven very satisfactory with this firm, whose business has developed into the millions, and who now are manufacturing most of the premiums which they offer with their goods.

Recently, certain firms have increased the sale of pianos largely by placing them in the house of the customer for thirty days on free trial, and then making the sale, upon easy terms, in monthly installments. Probably, on account of the possible losses, the customer pays a good price for the instrument, but is perfectly willing to do so in consideration of the easy terms and length of time given for payment.

Where the entire business is practically done for cash, the accounting proper requires very few books of account. Practically all of the entries are made in the cash book, and the general ledger is the only other book needed. Where a general credit business is carried on, it necessitates a much more complicated system, which is further enlarged for those who couple with the credit business the installment feature.

Building Up a Business. The development of a successful catalogue business is very similar to the labor of any other particular line of trade carried to success. The most careful attention should be given in all cases to the little things, and all of the small details which can by any possibility add to the receipts without too greatly increasing the expenditures should be fostered with the utmost care, and built up in such a way as to become a producing factor of the business.

A reply to an advertisement may have a value or it may be entirely worthless, depending upon the manner in which it is handled. Two hundred replies to an advertisement may develop \$500.00 in business or they may not be worth more than \$2.00, according to the amount of energy displayed in soliciting the trade which should result from that number of replies. An inquiry cannot be con-

sidered as entirely dead until it has been worked upon for at least two years. The follow-up must be done in a thoroughly systematic manner in order to produce the best results. A firm with a thorough knowledge of the methods for "getting the business" will produce ten times the amount of business from the same number of replies as a competitor who does not understand the methods of following a possible customer.

Handling Inquiries. When letters in answer to advertisements or requests for catalogues are received by inexperienced dealers, they are generally very carefully answered, the promptest attention being given to the detail, and then are either pigeon-holed or thrown away. This method of work does away with all possibility for building up a successful business, and the opportunity for profitable business relations with these possible customers is lost. At some future time it may be necessary to recall certain of these inquiries, but without a record or a systematic method by which a person may be found, it would be utterly impossible to locate them.

A person who answers an advertisement of a catalogue house or sends for a catalogue has been one-half won over as a customer, before he receives anything from the firm in the way of printed matter. He may be a person in the habit of dealing with mail-order houses, dissatisfied for some reason with the house with whom he has been trading, or he may possibly be a person who has had no dealings whatever with a mail-order house, is not aware of the advantages they can offer in the way of prices and selection of goods, but is willing to be shown. Like a young plant, the growth and productiveness depends entirely upon the care and nurture given it.

A system should be provided at the beginning, by which all letters can be catalogued as soon as received with the name and address of the writer. A duplicate record card should be prepared, one to be filed alphabetically, and one according to state and town, the latter to be used when it is desirable to circularize a certain section. The form of these cards differs materially with different houses, but the form shown in Fig. 1 is adapted to the purpose whether a record of sale is kept on the card or not. In some respects, a record of sale is a very important item to enter upon the card. This record should be kept upon cards filed alphabetically. It is very useful in following up customers, as it shows the extent of the customers'

business with the firm, and there are many times when certain letters would be sent to inquirers or very small customers that would not be at all adapted to the needs of a good customer. The volume of mail is so large in a large catalogue business that it is practically impossible to keep all of the inquiry letters, and some houses, after obtaining their records and holding the letters for perhaps six months, sell them for a certain price to dealers.

The large merchandise houses doing an extensive mail-order business departmentize their business in a manner similar to the regular department stores, and have it so arranged that orders may be filled without any unusual delay. All mail that is addressed to the firm is received at the office of the general manager or superintendent. It is the duty of certain girls to open the mail, sorting the letters containing money from those that are simply inquiries. All inquiries are sent directly to the inquiry department, where they are read and answered by experienced persons. The requests for catalogues are handled in the usual manner, and all letters requiring a special reply are placed upon the desk of the clerk in charge of that class of dictation.

Every catalogue and form is numbered, and the literature to be sent to the inquirer is indicated by number by the person who answers the letter. All literature should be kept close to the inquiry department, so that any printed matter sent out should leave by the same mail with the letter of advice, in order that both may be received at the same time. The convenience of the location of different departments and the saving of time by having those closely related adjoin one another, like the stockroom and the shipping room, is a subject worthy of consideration.

The Order. As in every other business, the order is the first important factor, but unlike any other business, is the extreme necessity for accommodating possible purchasers and making their orders easy to prepare by sending blank order slips with other literature. Montgomery Ward & Company make up a block of ten order blanks with the calendar for the year and a view of their new building upon its face. At the bottom of the calendar are the words: *Do not tear off this top sheet, but, as you think of things needed, write them down on an order blank inside and when you are ready, tear out and mail to us.* Note the short words.

FORM 177-AJ

Enclosed please find

CHICAGO AND KANSAS CITY

\$_____

Say how much money you send

for which please ship me the following articles selected from your Catalogue No. _____

Name _____ (Please write your name plainly)

Postoffice _____

County _____ State _____

HOW TO BE SHIPPED } See Rules in Catalogue	Freight	Express	Mail Insured	Mail Registered	Special Prepaid Express (1c per oz.)
	(Make a mark under the heading selected)				

Shipping Point _____
(If different from Postoffice.)

What Railroad is your Shipping Point on? _____

Is there a Freight Agent at your Shipping Point? _____
(If not, be sure to send money to prepay charges.)

[illegible]

Fig. 2. Order Blank

The order blank shows how much money is sent, name, post-office, county, how to be shipped (whether by freight, express, mail insured, mail registered, or special prepaid express), shipping point, on what railroad is shipping point, and whether there is a freight agent at shipping point. The balance of the order blank, which fills the first page and continues on the reverse side of the order, gives space for number in catalogue, quantity, articles wanted, sizes, colors, etc., price of each per dozen, and a column to extend the total and add the amount. This blank is shown in Fig. 2.

MAILED BY _____ POSTOFFICE _____ STREET ADDRESS _____ COUNTY _____ STATE _____ R. F. D. NO. _____ P. O. BOX NO. _____	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> Put a two-cent postage stamp here </div>
<h2 style="margin: 0;">MONTGOMERY WARD & CO.</h2> <p style="margin: 0;">Michigan Ave., Madison & Washington Sts. CHICAGO</p>	

Fig. 3. Self-Addressed Envelope

In cataloguing, every article is given a number, and buyers are taught to order by number. As a large number of catalogues are issued, it is necessary to give the number of the catalogue at the time of giving the order.

To make it still more convenient for customers to forward orders, an addressed envelope, shown in Fig. 3, is enclosed, which not only has the address of the receiving firm, but ample space for the name and address of the sender.

Registering Orders. The handling and registration of the very large number of orders received is a very simple matter. When a letter containing an order and money is received, the amount of money is entered upon the letter or order with blue pencil, and it is numbered

Sheet No. _____,

MONARCH STORE MAIL ORDER REGISTER

Month of _____ 19__

REG. NO.	DAY	NAME	ADDRESS	AMOUNT	DATE FILLED	REG. NO.	DAY	NAME	ADDRESS	AMOUNT	DATE FILLED
		Amt brought Ford.						Amt brought Ford.			
00						25					
1						26					
2						27					
3						28					
4						29					
5						30					
6						31					
7						32					
8						33					
9						34					
10						35					
11						36					
14						39					
15						40					
16						41					
17						42					
18						43					
19						44					
20						45					
21						46					
22						47					
23						48					
24						49					
		Amt Carried Ford.						Amt Carried Ford.			

Fig. 4. Register of Mail Orders

with a numbering stamp in numerical order. This number identifies the order all through the line until finally shipped. *No copy of the order is taken.*

As soon as the cash is abstracted from the letters or orders and the number has been stamped thereon, a girl takes the orders and enters them consecutively, merely entering the name, address, and amount upon the line showing the proper number on the order register sheet. This sheet, as shown in Fig. 4, contains one hundred numbered lines to the page, beginning with 00. The previous digits of the register number are indicated by the sheet number. For instance, order number 36548 would be entered on sheet number 365 on line number 48, etc. This sheet is used as the detail cash receipts for the day, the total amount only being entered in the general cash, the amount of money received being verified with this total by the cashier.

The orders are then assorted to departments, and a numbered envelope, Fig. 5, is pinned to each order for the purpose of receiving the checks of different departments through which the order may be obliged to go, and any documents connected therewith. Before going to the departments, the order is checked up to verify prices and additions, and, if an under payment or an over payment is made, this fact is noted on a slip which is placed within the envelope to accompany the order upon its journey through the house to the shipping department. The customer's envelope has space for entry of the order number (which should

CUSTOMER'S ENVELOPE.	
Order No.	_____
When Received	_____
Received in Stock Room	_____
Dept. No.	_____
Filled By	_____
O.K.'d By	_____
Wrapped By	_____
Date Shipped	_____
How Shipped	_____
Shipped By	_____
Amount Received \$	_____
O.K.	_____

All memoranda, receipts and papers belonging to this order must be placed in this envelope and returned with letter to the Filing Department.	

Fig. 5. Customer's Envelope

be the same number as that stamped upon the original order), when received, received in stockroom, department number, filled by, *O.K.'d* by, wrapped by, date shipped, how shipped, shipped by, amount received, and *O.K.* All memoranda, receipts, and papers belonging to this order must be placed in this envelope and returned with the letter to the filing department.

OFFICE COPY Order No. _____

BACK ORDER Order No. _____

D Date _____

S Ship to _____

Date original order _____ Date shipped _____ Via. _____

Fig. 6. Back-Order Slip

The object of this envelope is to keep together all of the data concerning each order; for instance, if shipped by express, the express receipt is placed therein; if it is found, on filling the order, that the customer has remitted a few cents too much, a credit ticket is placed therein; if he has remitted too small an amount, a debit ticket for the difference is placed therein, etc. If the entire order cannot be filled immediately, a back-order ticket is made in duplicate and the duplicate placed in the envelope, the original being filed to be filled as early as possible. When filled, the original is stamped and, together with the evidences of shipment, is filed in the same envelope. A sample of the back-order slip is shown in Fig. 6. The back-order slip has simply the number of the order,

date received, name and address of the customer, and the list of goods ordered that have not been shipped.

Many catalogue houses acknowledge receipt of order from their customers. This need not delay the order in any way whatso-

MARSHALL FIELD & COMPANY
RETAIL.
 MAIL ORDER DIVISION
 STATE, WASHINGTON, RANDOLPH AND WABASH
 CHICAGO, _____ 190

Your favor of _____ is received and
 entered upon our Register as No. _____
 amount received _____. In making your reply
 do not fail to use this blank, or to give the number of your order.

Yours very truly,
MARSHALL FIELD & COMPANY

By _____

PLEASE REPLY IN SPACE BELOW,
 Replying to above would say:

Date _____ 190

Fig. 7. Acknowledgment of Order

ever, as the acknowledgment may be made out from the entry in the order register. A form for the acknowledgment used in the mail-order department of Marshall Field & Company is shown in Fig. 7.

Samples. It is the custom of most houses that deal in dress goods to send samples of fabrics at the request of their customers.

With a very large number of customers, this portion of the general work assumes considerable magnitude, and a special department is organized for the purpose of preparing and mailing the samples requested. These samples must be selected with the utmost care, and each one of them labeled with the price, providing the prices

<h2 style="margin: 0;">SAMPLE ORDER.</h2> <hr style="width: 10%; margin: 10px auto;"/>	
M	<div style="border-bottom: 1px solid black; height: 1.2em; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 1.2em; width: 100%;"></div>
<div style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;"> STOCK </div>	<div style="border-bottom: 1px solid black; height: 1.2em; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 1.2em; width: 100%;"></div>
Samples of <div style="border-bottom: 1px solid black; width: 80%; display: inline-block;"></div>	
<div style="border-bottom: 1px solid black; height: 1.2em; width: 100%;"></div>	
From Order No. <div style="border-bottom: 1px solid black; width: 150px; display: inline-block;"></div> Date <div style="border-bottom: 1px solid black; width: 150px; display: inline-block;"></div>	

Fig. 8. Order for Samples

differ. If the prices do not differ (that is, a number of samples of dress goods of the same quality and value), one price tag is sufficient for the lot. When a request for samples is received in the inquiry department, a sample order is made out as shown by Fig. 8, and forwarded to the proper department, where the order is filled and mailed.

The proper handling of the sample division is very important on account of the fact that a large percentage of orders are received

from those who request samples to be sent by mail. It is a duty of the correspondence department to follow up such requests with appropriate literature, providing orders are not received within a moderate time. The facts in regard to the receipt of orders can be obtained from the inquirer's reference card, as it is the duty of the proper clerk in the order department to enter upon these reference cards the amount of the orders received each day.

THE FOLLOW-UP SYSTEM

Although the importance of the follow-up system has already been mentioned, it is well to call attention again to the necessity of constant effort to convert inquirers into customers, and also the effort necessary to retain and satisfy a customer after receiving his first order. This department is usually very thoroughly organized, with able correspondents to handle the special letters that require their attention, and careful, systematic clerks to answer such letters as may be answered by regular form, and to select the proper "follow-up letter" required in each particular case. This is a science in itself, and requires a person of great capacity and the best of judgment. False economy in this department is paid for dearly by firms working for business through the mail.

Closely allied to, and a part of, this system is the filing department. With the many thousand index cards under its charge, it is a matter of constant and careful attention to keep those addresses as nearly up to date and correct as possible. Mail-order buyers frequently change their addresses, and this occasions constant changing and manipulation of their index cards. Letters sent to wrong addresses and returned unclaimed result in not only the loss of postage and the cost of advertising matter but also the loss of a possible customer.

All letters are filed under the name of the person or firm signing, and the files are emptied regularly, either once per month, once every three months, or once every year, according to the needs of the business. This method gives especially good service in a small business. In conducting a large business, inquiry letters are usually destroyed after a time, as the dependence is placed entirely upon the record cards for following up the inquiry.

HANDLING CASH

The handling of the cash receipts even in a very large catalogue business is comparatively a simple matter, as the total cash receipts for the day, as shown by the entries on the order register, are turned over to the cashier, and are entered as one item under the heading of *merchandise sales*. Practically the only other cash receipts in this business are those on the open account ledger, which will be more fully described later, and the discounts earned by anticipating payment on purchases. The form, therefore, for cash receipts is very simple, having only the date, item, folio, open ledger, merchandise sales, and general ledger. The cash discount earned is brought forward from the credit side of the cash book (having been entered in the contra discount column in detail) the total at the end of the month being carried to the debit side in one item and credited to discount. This form is shown in Fig. 9. The cash receipts sheet described is suitable only for a catalogue house doing a cash business. If credit business, either regular or upon the installment plan, is done, it would be necessary to have, in addition to the columns mentioned, a column for each ledger or series of ledgers used in handling customers' accounts.

The matter of cash disbursements in a large house of this character is one of considerable magnitude, and cannot be fully described in the limited space at our command. With a very large number of clerks and employes, the pay-roll system similar to that used in large department stores is almost universally employed, and whether the payments of wages are made by check or in cash, it is handled in a similar manner by the cashier. All payments are made upon vouchers and these vouchers come from the different departments of the business, properly authenticated and either accompanied by the original bills or the *O.K.* of the officer who has compared the original bills with the voucher and passed it.

In the description of the purchasing department, will be described the details necessary in connection with vouchers for payment from this department. As a very large part of the expense of this business is for catalogue work and miscellaneous printing, this has also been departmentized and is handled, as far as cash payments are concerned, in a similar manner.

SHEET NO. 13

DAY _____ 19____

[illegible]

Fig. 9. Cash Receipts Sheet of General Cash Book

The miscellaneous and petty expenses of the business are handled by a detail sheet in the hands of a special cashier whose duty it is to make all payments in cash necessitated by the demands of the business. This is handled in the general cash book by first checking out a sufficient amount to cover these expenses for a definite period and charging the same to imprest account or to petty cash. An analytical report of various expenditures made by this clerk is turned in to the general bookkeeper at definite periods, either daily, weekly, or monthly, as the necessities of the business demand. This report is accompanied by vouchers as required. A check is given for the total amount, as shown by this report, which restores the imprest account to its original amount, and the charges are made to the definite accounts as shown in the regular report. A sample of the ruling for this sheet is shown in Fig. 10.

Cash Disbursement Sheet. The sheet for cash disbursements in the general cash should show the date in the heading, and in the columns, department, voucher number, check number, item, accounts payable, contra discount, interest, general expense, wages, refunds, freight in, freight out, posting column, and general ledger.

The general expense column is for every character of expense not provided for by the other columns. This column should be analyzed at the end of each month, and the amount of each class of expense carried in total to the general column, from which it is charged to its proper account. By having the various expense accounts numbered, the analysis is made easy by placing this number in the check column at the time the entry is made. The wage column is for the wages of employes, and does not include the salaries of executive officers, superintendents, or managers. The entries for salaries may be made either in the miscellaneous general expense column or in the general ledger column, and must be placed in the general ledger column if they are to be charged to the individual account. As advertising bills are usually paid monthly, it is hardly worth while to run a special column for this purpose. The refund column should contain the total of the refunds as shown by the refund clerk's register.

This form is shown by Fig. 11, and should be ruled and printed buff paper, and for convenience should be handled as a separate book. In making up a loose-leaf cash book, the sheets are numbered at

SHEET NO.

19

Fig. 11. The Credit or Disbursement Side of General Cash Book

the time they are made, and each sheet should follow consecutively, the same as in a bound book, each numbered sheet being accounted for. A sufficient number of sheets to last for thirty days is placed in a spring-back holder or sectional-post binder labeled *cash receipts* or *cash disbursements*, as the case may be. At the close of the month, after the posting is completed and the balance is carried forward to

[illegible]

Fig. 12. A Convenient Form of Check Register

the new month, the sheets are placed in a permanent sectional-post transfer binder. Some firms have their loose sheets bound annually, or semi-annually, properly labeled, and filed in the vaults for permanent records.

Banking. In this business, as in any other, the only proper method of handling cash is to deposit in the bank every dollar received, and to make all disbursements by check. Large houses like Montgomery Ward & Company and Sears, Roebuck, & Company use several banks for depositories. Each of these firms carry bank accounts in the principal cities of this country and in London and

Paris. It is absolutely necessary, where a number of bank accounts are carried, to have a check register for each bank. This register records the withdrawals and deposits, and shows the balance of each bank account, as shown in Fig. 12.

In order to make it especially convenient for customers, the refund checks sent out by the firms mentioned above are payable at any bank in which they carry an account, the list being given on the left-hand margin of the check. It is impossible to tell in advance on these checks from which bank they will be paid, therefore a separate refund check register is kept, upon which the checks are cancelled when returned by the banks paying them; a recapitulation sheet showing the credit due each bank is given to the cashier each month. These sheets are accompanied by the checks, and the total amount is entered to the credit of the bank in its proper register. As these checks are invariably of small amounts and as sufficient balances are always kept in each of these banks, there is no probability of their payment ever creating an overdraft. In making up the cash balance, the total amount of checks drawn as shown by the refund register balance is deducted from the total of the various bank balances.

Purchasing Department. It is hardly possible to realize the magnitude of the purchasing and receiving departments of a business house doing a \$50,000,000.00 business per annum. A volume might be written upon this subject which of necessity will be covered very briefly.

The manager of the purchase department is assisted by a sufficient number of aids to fully cover the necessities of his daily work, and these aids are usually selected on account of their intimate knowledge of certain classes of goods handled by the firm, the selection and purchase of which devolve upon them.

An elaborate card system, showing costs upon every different article handled, quotations from manufacturing and jobbing firms, lists of firms manufacturing or dealing in the article, net prices, terms, and discounts, forms an important adjunct to this department, and one which requires a considerable amount of clerical help in its operation.

The managers of each of the different departments keep a close record of their stock, and when any article reaches its established

minimum, a requisition is immediately made upon the purchase department for an increased supply. As it is necessary in some lines to have the order in several weeks ahead of the time when delivery is to be expected, on account of the fact that the goods must be especially manufactured, it is a matter of considerable judgment and discretion on the part of the various managers and stock clerks to keep their stock full and complete, so that orders may be promptly filled and so that every article catalogued may be on hand when called for.

The immense importance of the purchasing department of a large mercantile institution necessitates the utmost care in the selection of buyers, and a constant attention upon their part to the duties of their office. In order to facilitate their work and to allow as much of their time to be given to the selection of goods and the securing of the best prices and terms for their purchase, the accounting in this department has been minimized as far as possible.

Requisitions for Goods. A requisition is written and forwarded for every order. If it is found necessary to order by telephone, telegraph, or verbally, the written requisition should follow to verify the order. This prevents misconception, assists in the proper filling of the order, and places the responsibility upon the one who makes the requisition. This being the case, all requisitions should be written, examined, and verified with the utmost care; every point in the description of the order should be covered in detail, and there should be nothing left to the discretion of the consignor in its fulfillment.

The requisition is usually in duplicate or triplicate, each copy being numbered alike, consecutively. It is about 6×8 inches in size, the duplicate being punched for a solid-post binder. This is illustrated in Fig. 13. Any other copies of the order usually taken for reference or recapitulation purposes are not necessarily punched. The original should be mailed. The bill rendered for the goods required by this order or for any part of the order should bear the number of the requisition.

Registering Requisitions. All requisitions should be registered as soon as made. This registration is very brief, merely giving the number of the requisition, the date, to whom issued, the probable amount, for what department, date to be delivered, date delivered,

and any remarks covering special information regarding the transaction. If it is desirable to know any more about the order than is offered by this register, the number of the requisition may be obtained from this book and a reference made to the duplicate which has been filed. The sheets are $9\frac{1}{4} \times 12$ inches in size, or they may be made large enough to accommodate fifty or one hundred numbers upon

MONARCH STORE

Put Number on Bills and Packages. NO.

Put Number on Bills and Packages. NO.

Put Number on Bill and Packages. NO.

To _____

Date _____ 19____

Gentlemen: - Please send us the following goods via _____

Acknowledge and advise when you will ship.
Route as advised.
Send bill lading.
Put order number on all packages.
Furnish duplicate bills.

THE MONARCH STORE
By _____

Fig. 13. A Simple Form of Purchase Requisition

each side of the sheet, as described in the registering of orders and shown in Fig. 4. The form for requisition registering is shown in Fig. 14. This sheet should be kept in a spring-back holder for regular work, and a sectional-post binder should be provided for the sheets after every order has been filled and all deliveries made. In a very large business the buyers of different departments have their own requisitions, and each runs a separate registration. The third

The Receiving Department. This busy hive of industry attends to the receiving and checking of the large amount of goods purchased daily. It also sees that the goods are forwarded to their proper departments, and the entire routine must be handled with the same clock-like precision of other departments. Notwithstanding the large

[illegible]

number of employes in this department, it has very little real accounting work. The object of this department is to see that the goods received are as represented by the bills, that the quality is up to the grade ordered, and that the proper prices have been made if quotations have been received or if there is an agreed rate. For this purpose, the receiving department is frequently furnished with copies of all requisitions which are filed. These are produced when the goods are received, and the original order compared with the invoice of the consignor. The extensions are not usually made in this department but, as soon as the invoice is checked, it is forwarded to the purchasing department from which it emanated, where it is rechecked with the original requisition and *O.K.'d* and sent to the accounting department.

Purchase Record. As soon as the bill is received, and before it is sent to the receiving department, it is entered in the purchase record, the bills being numbered consecutively as received. The advantage of entering bills at once, not waiting for the arrival of the goods and the checking of the same, is that every invoice appears upon the books whether the goods are in transit or not. After the goods have passed through the hands of the receiving department and the purchasing department, they are returned to the accounting department where the *O.K.'s* are checked in, the extensions made, the footings verified, and the bills *O.K.'d* for payment.

As catalogue houses invariably discount their bills, it is unnecessary to keep a purchase ledger, the purchase record being entirely sufficient to keep track of the accounts payable. As the distribution to different departments is accomplished through the voucher register, it is only necessary at the close of the month to charge the total amount of the purchases as shown by the purchase record to an account called *distributed accounts* and credit to *accounts payable*.

The purchase record, Fig. 15, shows by its ruling in the heading the sheet number (which should be consecutive), day, month, and year of purchase; in the box are columns for department, record number, from whom purchased, *our* order number, *their* number, date of invoice, *O.K.'s* (received by, examined by, extended by), allowances (freight, rebates, and shortage), voucher number, net amount, and date of payment.

Advertising Department. This department attends to all of the general advertising for the firm outside of the catalogues. It is managed by men who have made advertising a study both in the matter of copy and the selection of the proper mediums. It is usual for the directors of a large corporation to make an annual appropriation for advertising, which appropriation is divided according to the best judgment of the advertising department manager, not equally, month for month, but a large amount being allowed for the heaviest trading months of the year and a smaller amount for the duller period.

It is advisable to have all bills for advertising come to this department, be *O.K.'d*, and returned to the general accounting department for payment. In order for the advertising manager to know exactly where he stands at all times, the same method of req-

SHEET NO. 1

SHEET NO. 1

MONTH OF _____ 19__

MONTH OF _____ 19__

Fig. 15. A Purchase Record Used where all Bills are Discounted

quisition, requisition register, and record of invoices should be used in this department as is used in the purchasing department.

Card files are kept for different mediums showing the particulars in regard to circulation, width of column, frequency of issue, price, and any other data necessary. Card records are also kept of all contracts made, these records being arranged in such a manner that the fulfillment of the contract is checked upon the card. For a new

Publication		Date		Key No.	
Space Used		Price \$		Kind of Ad.	
190	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31				
Jan.					
Feb.					
Mar.					
Apr.					
May.					
June.					
July.					
Aug.					
Sept.					
Oct.					
Nov.					
Dec.					
Total Number of Inquiries		Average Cost of Each			
Remarks					

Fig. 16. Record of Replies from Advertising

business or a moderate-sized business, where it is advisable that results should be known in order to enable the management to select the most profitable line of advertising, a card or loose-sheet record of replies from each advertisement should be kept, as shown in Fig. 16. This sheet gives the publication, date, key number, space used, price, kind of advertisement, total number of inquiries, average cost of each, and remarks, and is arranged to show in different columns the days of the months, and in the first column, the months of the year beginning with January. Where this record is kept in the advertising department, the envelopes from all inquiries are turned over to this department for checking.

Bills for advertising as they are received are examined and compared with the records. If they are found correct, they are *O.K.'d* and sent to the accounting department for payment, where they are treated in a manner similar to bills for purchases of goods.

Catalogue Department. As has been stated, the catalogue is the basis of all trade and solicitations for trade in a business of this character, and it follows that the talent employed in this department should be of the largest caliber. Many houses have a dozen catalogues, and some have over fifty. Each of these books must be prepared with the utmost care, it being constantly borne in mind that they are the messages of the firm to its customers, by which it expects to attract custom, and retain trade. As styles and fashions change frequently in most commodities handled, it naturally follows that catalogues must be kept up to date. The first important point then, is to have a sufficient number to supply the demand until such changes are necessary, and never an oversupply to be wasted.

As illustration is such a strong point in the selling of goods by mail, it is necessary that each article be considered separately with a view to its proper illustration, and frequently a department of engravers and artists is kept busy all of the time. It is also often the case that a completely equipped printing office is run in connection with the business, in which a system of accounting, perhaps not so elaborate as, but similar to, that described in *Accounting for Publishers and Printers*, should be employed.

Where the printing is done by outside firms, the catalogue department receives, examines, *O.K.'s*, and registers the bills for labor, paper, and other supplies in the same manner that has been described in the advertising department.

A daily report is made to the general manager of the business, showing the number of catalogues of each number or description on hand at the beginning of business of the previous day; the number used during the day, and the number on hand at the close of business. This gives the management at a glance information as to which of the catalogues is being used the fastest, and what class of goods is in demand at certain periods, and the number called for each day indicates clearly, by the monthly summary which is kept, the total number of catalogues of any edition necessary to print.

As the expense to the firm of postage upon the very large number of catalogues necessary to be sent out during the season is a considerable item, it devolves upon the manager of the catalogue department to select the lightest-weight paper possible that will take the cuts properly and stand printing on both sides. Requests for catalogues are sometimes filled directly from this department, and sometimes the mailing of catalogues is a part of the business of the inquiry division.

Correspondence Department. While not a part of the accounting department, the duties of the correspondents will be briefly referred to here. All letters necessitating a reply are referred to this division, and certain clerks are employed to take up each character of the work. The matter of the following up of inquiries by form letters is also handled in this department.

It is the custom of all catalogue houses that do business on a cash basis to take back goods and refund the money for any goods purchased that are not found perfectly satisfactory by the customer. Some houses also include the freight or express paid by the customer in such cases. There is no needless correspondence in connection with refunds, for the mere fact of a customer's dissatisfaction is sufficient in most cases. The refund clerk usually attends to the matter of approving the claim and making the check which is handed to the correspondence department to be sent to the customer with whatever letter may be deemed necessary under the circumstances, or that may be calculated to heal the breach and retain his business.

In connection with the correspondence department is the filing division. This division attends to the filing of inquiry cards, customers' cards, and all letters; therefore, adequate space and all of the necessary filing devices must be provided to care for the large amount of matter to be disposed of daily. In a business of this kind, it is of the utmost importance that the files be kept up to date, that all entries pertaining to correspondence, follow-up letters, orders, rebates, and allowances shall be entered each day. The important matter of the change of addresses in the customers' list must receive immediate attention in order to save the firm from useless expenditures for postage and printed matter.

Shipping Department. The shipping department is conducted in much the same manner as that of a large department store. Orders

are completed in the various house departments, sent to the wrapping room to be checked, wrapped, crated, or boxed, and thence to the shipping department to be dispatched by mail, freight, or express, as the case may be.

The same perfect system is observed in the shipping department that is found in every other section of the great store. Receipts for goods as shipped are placed within the envelope which accompanies


<p>C.O.D. No. _____</p> <p>ROTHSCHILD & COMPANY State St. Van Buren St. Chicago.</p> <p>Date _____ Dept. _____ Clerk _____</p> <p>Name _____</p> <p>Res. _____</p> <p>Near _____ Flat _____</p> <p style="writing-mode: vertical-rl; transform: rotate(180deg); font-size: small;">Before Goods Leave Counter Send this Check to C.O.D. Office.</p> <div style="border: 1px solid black; width: 80px; height: 60px; margin: 10px auto; position: relative;"> <div style="position: absolute; top: 5px; left: 5px; font-size: x-small;">Inspector's</div> <div style="position: absolute; bottom: 5px; left: 5px; font-size: x-small;">Stamp</div> </div>	<p>C.O.D. </p> <p>ROTHSCHILD & COMPANY State St. Van Buren St. Chicago.</p> <p>Date _____ Dept. _____ Clerk _____</p> <p>Name _____</p> <p>Res. _____</p> <p>Near _____ Flat _____</p> <p style="text-align: center; font-size: small;">For Special Shipping and Packing Instructions See Reverse Side.</p> <hr style="border-top: 1px dashed black;"/> <p>Date _____ Dept. _____ Clerk _____</p> <p>C.O.D. No. _____</p> <p>Name _____</p> <p>Res. _____</p> <p>Near _____</p> <p>Am't. Due _____</p> <p>Driver _____</p>
--	---

Fig. 17. Front and Reverse of C. O. D. Delivery Ticket

the order from the time it is received and checked in until it is finally shipped. As soon as the shipment is made, the order and all of the papers accompanying it are sent to the accounting department, where the envelope is filed numerically according to the order number, and the order or letter is filed alphabetically according to customer's name.

Every catalogue house has a large c. o. d. business and it is customary to require a deposit of a certain amount before the goods are shipped, although this is not always demanded. At the time of the receipt of the order, the clerk in charge of the c. o. d. department makes out a ticket, like that shown in Fig. 17, which is pinned to the order. This ticket gives the name and address, amount due, c. o. d. number, date of shipment, driver, and remarks. The

Sheet No. _____		MONARCH STORE					
		ROUTE SHEET					
		Date _____ 19__					
Route No. _____		Checked in by _____					
From Main _____		Left _____ A.M. _____ P.M.					
From Sub-Station No. _____		Drivers Name _____					

NO OF PACKAGES	NAME	ADDRESS	NEAR	FLAT NO.	C.O.D.	CUSTOMER'S RECEIPT OR REMARKS
1						
2						
3						
4						
5						
6						
20						
21						
22						
23						
24						
25						
26						

Fig. 18. Driver's Route Sheet

route sheet for the c. o. d. city deliveries is shown in Fig. 18. Any amount remitted as part payment of a sale is considered as a cash sale in the handling of the funds. The order goes through the house in the usual manner. When it has been filled and reaches the shipping department, it is forwarded according to orders, proper notations are made upon the c. o. d. ticket and the ticket is placed within the envelope before mentioned. When this envelope is returned to the accounting department, the c. o. d. ticket is turned over to the clerk who has charge of this department, and is entered in a register kept for that purpose.

All payments of c. o. d.'s received are turned over to the c. o. d. clerk, who checks off the amount upon his register and makes a daily report of the total c. o. d. receipts to the cashier with the accompanying cash to balance.

STOCK-KEEPING

A large catalogue house is departmentized in much the same manner as the wholesale dry goods house. It is most convenient to have the goods of similar character all under the charge of a competent manager who understands all about the goods handled. Thus, the furniture department will have at its head a man versed in the handling of furniture, the musical instrument department will have in charge a competent man in this line, etc.

These firms realize perhaps more than any other the great importance of a perpetual inventory or a perfect record of stock. The customer who receives the catalogue of the house naturally expects that whatever he selects from this catalogue will be found in stock, and that his order will receive prompt attention. Nothing hurts a mail-order house more than delays in shipment of orders, and it is consequently of the greatest importance not to let any of the lines run out as long as the goods are advertised in the catalogues.

The only way to prevent this is to keep a stock record in each department which will show all of the withdrawals from stock as well as the additions, and, if this record is kept correctly, an inventory of the department when taken is merely a proof of the accuracy of the stock clerk's work. The stock record furnishes the means of ascertaining the exact financial condition without taking an inventory, but such an inventory is taken at regular intervals to verify the balances, just as cash is counted to verify the cash balance.

The regular loose-leaf stock record is a sheet usually about 9×12 inches in size, and is illustrated in Fig. 19. The sheet should be headed with the name and the number of the article. The cost of the article should appear in its proper place; every sheet registering an article should begin with sheet *No. 1*. The following sheets for the same article are numbered consecutively. The unit of measure should be entered. It may be single, dozen, gross, pounds, gallons, feet, or yards. There are dozens of other units of measure according to the commodity. There is only one cost that should go

The ruling of the sheets shows date received, quantity received, requisition number, quantity withdrawn, and balance on hand. On opening an account, the quantity of any article as shown by a careful inventory should be entered with date in the forwarding line under *received*. Each addition to this particular stock is entered with date under *received*. Each withdrawal is also entered and the balance on hand is carried forward to the balance column.

[illegible]

Fig. 20. Requisition to Purchasing Department

A limit to the amount carried should be entered at the head of the leaf, also the minimum, but this should be done in pencil, as it is liable to change.

Whenever the stock approaches the minimum, a requisition, Fig. 20, to the purchase department should be made, the duplicate of which is deposited in a box with chronologically arranged tabs under proper date, so that the goods may be hurried along if they are too slow. Verbal statements should be eliminated as far as possible. A written request can always be filed for reference, and many times settles a disputed question. The carbon copy of the requisition made by the stock clerk should be placed in the tickler as far ahead as his judgment indicates is necessary. If he were ordering something which

he knew would take thirty days to procure, it would be foolish to call the matter to mind in a week.

Open Account Ledger. This is the term applied by catalogue houses doing a cash business to the ledger in which are recorded such open accounts as must necessarily occur from time to time. It is very frequently the case that these accounts do not remain open but a few days; nevertheless, the records must be kept in such a manner that the firm will know what customers are indebted to them. There are numerous circumstances which leave these small accounts open. For instance, by some error a good customer might make a mistake in his remittance, and, instead of sending thirty-four dollars and twenty-four cents (\$34.24), he sends twenty-four dollars and twenty-four cents (\$24.24). While this order, for a new customer, would be held over, awaiting the balance, for an old customer, the goods would be shipped at once, with a courteous letter showing his mistake. While awaiting remittance, this account must go into the open account ledger. Another case: suppose an order had been received for a sewing machine fully paid. The sewing machine is shipped but does not prove to be the one the customer wanted. The customer is in a hurry for the machine. The proper machine is shipped at once and the customer advised to return the other machine. It will be seen that as two machines have been shipped and only one paid for, there must be an open account kept with the customer for one machine until it is returned and properly credited. The form of this ledger is immaterial, but the most convenient form is the balance ruling, shown in Fig. 21.

Whenever these open accounts occur, a notation to that effect will be found in the envelope returned to the accounting department. A record is made of the charge on a charge sheet, the only information necessary to be given being date, number of the order, name and address, and the amount of the open charge. This form is shown in Fig. 22. Posting is made direct to the ledger accounts from this book, and the totals are credited to merchandise sales at the end of the month, and charged to the controlling account of *open account ledger*. If any further details are required in regard to the charge at any time, they are obtained by reference to the record in the envelope as shown by the order number.

When these charges are received by the accounting department,

SHEET NO. _____

MONTH OF _____ 19__

[illegible]

Fig. 23. Mail-Order Charge Register

bered consecutively, the number of the order being placed upon the letter or order slip received from the customer. This letter or order slip after being copied and checked is filed in its proper place. In some houses where the order received covers goods to be found in several different departments, a number of copies of the order are made, or at least copies of the order for the goods from each different department. The goods are selected, marked with the order number, and sent to the shipping room, where they are collated and checked against the entire order before shipment.

As soon as received, each order is registered in an order book under its proper number showing date received, customer's name, and amount, providing this amount is easily obtainable; if not it is entered after the order is filled and billed. All orders are checked by the inspectors in the shipping department, and afterwards sent back to the accounting department to be billed.

After being billed, which is usually accomplished by the bill-and-charge system, the orders are checked upon the register, given a consecutive office number, and filed in solid-post binders divided for posting into the different ledgers.

Mail-order houses that do a regular credit business employ the same general forms as those used in the large department stores.

The Ledger Service. There are two classes of ledgers in use by catalogue houses—the loose-leaf (with as small a page as possible) and the card ledger, the ruling in either case being identical. Whichever plan is adopted, it is best to divide the ledgers into series and arrange them by town and state alphabetically, as far as the indexing is concerned. It is usual to give as many ledger sections to a book-keeper as he is able to care for, and to call this number of ledgers or sections (no matter whether it is two ledgers or eight ledgers) a *series*. With the charge sheet arranged in the same manner as the ledger, each series being kept separately, and with the cash receipts entered in a like manner upon different detail sheets, the posting to the various ledgers becomes a very simple matter.

Installment Ledger. Those who do business on the installment plan use a different form of ledger, on account of the fact that the installments are small, and come at frequent intervals, while the original sale is usually for a considerable amount. An installment sheet of the William Gerner Piano Company is shown in Fig. 24.

[illegible]

Fig. 26. Reverse of Order Blank of Larkin Co.

Each sale to a customer consists of several units of products and premiums, in addition to the allowance of a certificate premium (or the issuance of a certificate). It often happens that a due bill is issued instead of the shipment of the regular premium. In fact, the complications and variations are numerous. The tallying and proof of the various components of a sale would require excessive detail in description, but it is similar to the methods employed in auditing sales in a department store. Practically no forms are used, as this proof is made by the segregation of items and classifications through the use of the adding machine. One of the Larkin certificates is shown in Fig. 27.

Certificate issuance and redemption is tallied according to series numbers, one series for each year, and is thus carried on the general books. The balance due customers for certificates not redeemed for various years, is carried in separate accounts for each year, and finally, after five or six years have passed without redemption, are closed out to loss and gain. For due bills issued, a carbon copy is taken and kept upon file until redemption. This carbon file practically represents a ledger covering due bills redeemable.



Fig. 27. Premium Certificate

Larkin Company do not use a regular voucher system, but send out their own form, Fig. 28, upon which they request all bills to be made. This form represents the voucher, and is handled accordingly. We are informed that about 95% of their vendors use this form, and, where they do not, a form is attached and filled in at the office. All payments are made upon the authority of these invoices properly approved and audited, with the original record of the goods received, if any, attached to the invoice. Absolutely all disbursements are handled through an accounts payable record. They do not find it necessary to re-check the shipping authority, after shipment against the original number or order.

On the back of the invoice furnished is printed:

HOW TO INVOICE LARKIN COMPANY.

Invariably make invoice to us on this form. Fill in all spaces except those in red ink. Use no technical or trade abbreviations.

Deduct trade discount.

For a shipment to one of our branches, make invoice in duplicate, mail original with *b/l* attached to Buffalo specifying shipped to _____ branch. Mail duplicate, without price extension to branch.

LARKIN COMPANY.

[illegible]

Fig. 28. Mail-Order Invoice

Returns and Rebates. A very careful record is made of all returns and rebates, but the record sheet, Fig. 29, is very simple.

It consists of a loose-leaf sheet, size 11×11, to be handled in a sectional-post binder. The ruling and printing shows the sheet number, section to credit, and date. In the body is entered from whom received, address, kind, number, account number, credit number, totals, amounts, check column, and posting data. The claims as verified and approved are entered in this journal and posted to the separate accounts, and a check is sent to cover them wherever necessary. At the end of the month the entries are analyzed, and the

SHEET NO. _____ CREDIT TO. _____ DATE _____ FROM _____ TO _____														
	RECEIVED FROM	ADDRESS	STATE	KIND	NO.	ACCT. NO.	C. R. NO.	TOTALS	AMOUNTS	✓	J.V.	DATE	J.V.	DATE
	Mr. J. H. Clay	Joplin	Mo	P	15826		165370		10			2-10-11		
	Mr. H. D. Dault	Keokuk	Iowa		7971			1						
								2						
								3						
○								4						
								5						
								6						
								7						
								8						
								9						
								10						

Fig. 29. Record of Returns and Rebates

totals of the different classifications charged to their proper accounts. It would not be possible to cover the entire ground of rebates, allowances, returned goods, etc., as it is too varied and involved, and could not be fully described without elaborate detail.

Refund Register. A certain clerk has entire charge of the refunds. All papers pertaining to this subject come to his desk, and, upon being approved by him, a check is issued to be forwarded immediately to the customer. A register is kept of these transactions, this register, Fig. 30, showing in the heading *Refunds for month of* _____. In the body of the form are spaces to enter the day, name, address, amount, of claim, express or freight, amount of check, number of check, and bank. At the end of a given period (either daily, weekly, or monthly, as may be determined by the cashier), the total amount of checks drawn for refunds is given upon a slip to the cashier, verified by the check book, and entered in the general cash as a charge to *Merchandise Sales*.

SHEET NO. 13

REFUNDS FOR MONTH OF _____ 19__

[illegible]

Fig. 30. Refund Register for Mail-Order Business

VOUCHER REGISTER

DATE	VOUCHER NO.	IN FAVOR OF	GENERAL			OPERATING EXPENSE			SELLING EXPENSE				
			LEDGER	DISCOUNT	CONTRACT	PRODUCTION	WATER TAX	FUEL LIGHT	FREIGHT & EXP out	COM-MISSION	SALES-MEN'S SAL.	ADVT.	TRAVELING EXPENSE
		Amount For'd.											1
													2
													3
													25
													26
													27
		Amount For'd.											

VOUCHER REGISTER

GENERAL EXPENSE																	FACTORY MDSE					MACHINERY					REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
OFFICE SAL.	PTG. & STY.	POSTAGE	LEGAL PATENTS	OFFICE EXPENSE	NON-PROD LABOR	TEL. & TEL.	INS.	MISC. EXPENSE	MTLS.	FREIGHT EXPRESS IN	MACH. NEW	GEN'L. TOOLS	BELTING	SHOP SUPPLIES NEW																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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Fig. 31. The Voucher Register

THE VOUCHER SYSTEM

Where the voucher system for the payment of accounts is used, and a charge has been made from the purchase record for the entire amount of the monthly purchases to *distributed or miscellaneous account*, the bills are collated according to purchase, and entered in a voucher register, Fig. 31, which is also a distribution book, carrying the charges to their proper accounts as the vouchers are issued.

The Voucher. The most common voucher is a form similar to the statement or bill form, the size being about 6×8 or 6×10 inches, the inside ruled to show a transcript of the items paid. This form folds lengthwise, and upon the reverse side, a distribution of the amounts paid is usually shown, with a space upon the fold for the number, and other filing information. It is not absolutely necessary to have the distribution appear upon the voucher. Some firms prefer it, and the main advantage to the bookkeeper of this arrangement is that it gives him the distribution complete, when the voucher is entered in the register. As a voucher is intended to be not only a receipt from the payee for definite items, but an authorized payment by the payor, it is necessary to have at least two officers of a corporation or two members of a firm, or one member and one employe (with authority) compare the vouchers with the bills to be paid, and affix their *O.K.'s* to them before payment. A form of voucher is shown in Fig. 32. The chief importance to the bookkeeper of the *O.K.* by officers is that it relieves him of the responsibility, and gives him a proper authority for making the payment.

When a voucher is returned receipted, it is placed in a numerical file. Some firms attach the returned voucher to the bills paid, and file in vertical files alphabetically, but this is frequently a very cumbersome method, especially where there are a great number of bills from one firm. A better way is to fasten together the bills paid, and stamp them *Paid by voucher No. __*, then file in a vertical file according to date, each firm having its folder. The returned vouchers are then filed in appropriate cases of proper size, by number, preferably in cases containing the vouchers for a month or other definite period.

The Voucher Register. A voucher register for the entry of all vouchers is a necessity. Vouchers are numbered consecutively when entered, or are numbered when printed, and entered by con-

Day _____ 19 _____

[illegible]

Sheet No. _____

Day . 19

[illegible]

Fig. 32. Front and Reverse of Voucher Check

secutive number. This register, Fig. 31, should be used for a distribution book and the totals charged to their various accounts, balancing or partly balancing *distribution or miscellaneous account*, to which they have previously been charged in bulk, and to which they must now be credited. It should show the monthly total of purchases and expenses. It is sure to have a large number of columns, but it is quite unnecessary to have special columns for items unless four or more entries per month are sure to occur. For occasional items the miscellaneous column is used. This column is analyzed at the end of the month, and can be sifted down until as fine as may be desired. When bills are vouched before payment, they are entered in the voucher register as soon as the voucher is made, and the notation as to time and check number of the payment is entered when paid. Most large firms have a definite pay day, and some of them two or three during the month, when all bills matured and bills to be discounted are paid.

The loose-leaf form is very popular for a voucher record or register, on account of the fact that such books when bound are very heavy and hard to handle, while, if made loose-leaf, it is not necessary to have more than a dozen or twenty sheets in the current binder, this quantity being sufficient for the entry of a month's business. Instead of having a book 38 or 40 inches wide, by the use of loose leaves on the folio plan (that is, having the entire list of entries extend across the book, using both sheets), the loose-leaf book can be brought in almost every instance into an eighteen- or twenty-inch width. The short columnar sheet works better in a loose-leaf than in a bound book.

At the end of the month, after all of the columnar additions have been made and verified, and the posting completed, the filled pages of the voucher register should be removed from the temporary or current holder and placed in a permanent voucher binder. This should only be done after the balance has been taken, as it may be necessary to do some checking from the voucher register. When posting is made direct from this register, it is always most convenient to keep the sheets in the current binder until it becomes absolutely inactive. In whatever way a voucher record may be kept, there must be some postings direct, either to the purchase ledger or to the general ledger, or to both, and it is therefore necessary to keep the

sheets intact until the balance is taken. Whenever all payments are vouchered, there will be payments made to members of the firm or officers of the corporation who have accounts only in the general ledger. It is therefore necessary to be sure that all of these items have been properly posted, and it is for this reason that great care is advised.

The question of minuteness of distribution is a matter altogether with the manager and the bookkeeper. A good bookkeeper is always alert for such divisions of accounts as will bring to the eye of the manager by totals and comparisons the information most desired. Care must be taken, however, not to go to the other extreme and have so many subdivisions or special columns that the care of them becomes excessive—this is what is usually termed *red tape*.

Numbering Accounts. Whenever a distribution of accounts is shown upon the back of a voucher, each class should be numbered or lettered, so as to readily designate it. This designation becomes very familiar to the bookkeeper and the receiving department. Purchases may be distributed in this manner by number or letter upon the bill in the receiving department. Specific disbursements should be aggregated according to their purpose. Thus, at the end of the month, quarter, half-year, or year, if these different columns are properly arranged, it becomes a very easy matter to bring together the disbursements of the various departments, enabling a complete statement to be made. At the same time it is the most explicit, complete, and satisfactory statement of expenditures possible. Such columnar totals are also very valuable for the production of comparative statements of expenditures or of expense in the different departments.

Comparative Statements. The following is given as an example of comparative statements:

	1907	1908	1909
Merchandise Sales	51,357.68	62,987.34	93,487.50
Discount Earned	1,009.20	1,267.98	1,879.60
Total	52,366.88	64,255.32	95,367.10
DISBURSEMENTS			
Merchandise Purchased	40,908.99	48,990.78	73,407.50
Operating expense	8,796.20	9,120.50	10,120.60
	49,705.19	58,111.28	83,528.10
Net profit	2,661.69	6,144.04	11,839.00

This statement only gives the principal items, and may be divided and subdivided as much as the ingenuity of the bookkeeper or the demands of the business require.

GENERAL LEDGER

From what has been already stated it will be seen that a very large portion of the labor connected with the handling of an immense catalogue business is done without the aid of books properly belonging to the accounting department. Every detail in every department leads up to the general ledger, through the cash book principally, and the journal in a lesser degree.

The number and character of accounts carried in the general ledger for this business do not differ from that of a large department store or wholesale business, with the exception that many of the mail-order firms desire a special catalogue account to show the expenditures upon this class of work from time to time during the year.

After the last journal entry has been made, the general ledger balances represent the real status of the business. For instance, the merchandise purchase account balance, after the entry of the inventory for the year, shows the exact cost of goods sold during the year. The merchandise sales account shows the exact amount received, or to be received, for goods sold during the year. What is the logical way to show the gross profits? It is to carry the balance of these accounts to the trading account, and the difference between the debit and credit side will show the gross or trading profit.

In case of departmentization it is necessary to subdivide the total trading account and to debit or credit the different departmental accounts, unless the department accounts have been separated and kept separately during the year.

A proper record of facts is at hand. A complete analysis of each profit-producing element should be made to appear independently of any other. Expenses should be differentiated and classified.

All selling expense accounts should be finally closed into an account of that name, all factory expense accounts into an account of that name, all office or general expense accounts into an account of that name, etc. Thus every general division called for by the nature of the business will show, in one account, all of the disbursements for the year, properly chargeable to that division.

Many bookkeepers transfer the balances of impersonal accounts (those that do not represent assets) directly and indiscriminately to the loss and gain account. While this method will show at its conclusion the net loss or gain, it is easy to see that it is not good bookkeeping. A proper classification of accounts is necessary. All merchandise sales are not a gain, neither should merchandise purchases be considered a loss, but the balance of the trading account (which is the gross profit for the period) may properly be closed into loss and gain.

All impersonal accounts that do not represent assets should be closed into provisional account as stated, and these accounts finally balanced by closing them into the loss and gain account. After this is done, the balance of the loss and gain account will show the net profit or loss for the year.

The principal general ledger account for a catalogue house (incorporated) would be

- Merchandise Sales
- Merchandise Purchase
- Cash
- Depreciation
- Capital
- Dividend
- Surplus
- Loss and Gain
- Discount
- Interest
- Office Expense
- Superintendence
- Labor
- Fuel
- Light
- Advertising
- Catalogue
- Traveling Expenses
- Legal Expenses
- Office Expenses
- Repairs
- Insurance
- Maintenance
- Freight In
- Freight Out
- General Expense

This should include the various controlling accounts necessary for subsidiary books. It is not intended that every necessary account

should be mentioned in this list, but that those mentioned are necessary.

In every large business it is extremely advisable to keep records of the progress of the business in every avenue through which it is expected to advance, and to present to the manager, as often as possible, brief statements covering these points. It should therefore be the aim of the accountant to know the accounting records perfectly and prepare proper statistics that can be handled in a definite manner at the shortest possible notice.

The intelligence of an accountant is practically measured by his ability to furnish the firm with statistical data, and it is therefore a very important part of his work to furnish all details regarding cash receipts, disbursements, purchases, sales, and expenses of administration, with profits and percentages whenever required.

The best form to use for the general ledger, whether bound or loose-leaf, shows date, item, debit, credit, debit balance, and credit balance, as in Fig. 33.

A DIFFERENT CATALOGUE BUSINESS

There is a class of mail-order or catalogue house of which nothing has been said thus far. This is the house that sells goods at wholesale to *dealers*, and does no business whatever with the consumer. Their trade is entirely through the use of catalogues, and the goods sell upon their merit and the prices quoted. These houses do not employ any traveling men, and, as far as the advertising is concerned, none of importance is done outside of the catalogues issued at intervals and sent to the trade all over the world.

It is the contention of those engaged in this business, that it is not necessary to come into personal contact with the customer, and the elimination of the traveling man and the large expense attached to this department enables them to sell the goods to the dealer at a lower price than their competitors who still use the traveling man can offer. Whether this is true or not, it is certain that the amount of business done by some of the leaders in this particular line is tremendous.

The chief exponent of this class of trade is probably the firm of Butler Bros., who have large establishments in Chicago and St. Louis, and who do a business going far into the millions annually.

Sheet No. _____

Account No. _____

Name

Address

DATE	ITEMS	FOLD	✓	DEBITS	CREDITS	DR. BALANCE	CR. BALANCE	DATE	ITEMS	FOLD	✓	DEBITS	CREDITS	DR. BALANCE	CR. BALANCE

Fig. 33. A Satisfactory Form for General Ledger

This business does not differ from the ordinary wholesaling of merchandise except as to the method of selling; therefore the accounting proposition is similar in all respects to that of a large wholesale house. The system of credits is very similar to that employed by regular wholesale houses, the same time and discount being given to customers who are entitled to credit as is done by others.

Under this system, the amount of goods sold to one house is probably far less than under the system of selling by traveling salesmen, but an advantage to be found in this method of work comes from the fact that there are a very large number of accounts widely diversified, and thus the opportunity for loss on individual firms is much less than it is where a very large line of credit is given to one house. It is believed that the percentage of losses to firms who are selling by catalogue is exceedingly small.

One feature which distinguishes them is the necessity for a very large number of customers' ledgers. The St. Louis house of Butler Bros. have over sixty customers' ledgers, all loose-leaf. As the accounts are not large, as a rule, the leaf for this ledger is one as small in size as possible. This firm even had a special leaf made about 6×9 inches in size, with the regular ledger ruling columns and the addition of a balance column.

These ledgers are arranged and indexed by state and town, alphabetically. Certain states where a very large business is done may have three or four ledgers, while there may be localities where the business is so light that one ledger will be found sufficient for two or more states.

The ledgers are marked plainly for the different states. There are alphabetical divisions for the towns or cities where business is done and in some cases specially tabbed leaves for cities where there are a large number of customers. The customers' sheets follow in alphabetical order under their proper city or town.

Ledgers in Series. In arranging the control of the customers' ledgers through the general ledger, it is found most convenient to arrange the ledgers in series rather than to have a controlling account for each ledger. The arrangement of these ledgers should be in accordance with the number of ledgers under the charge of one bookkeeper. It will be seen that for very active ledgers, it might be necessary to have one bookkeeper for three ledgers or perhaps four;

while for the inactive ledgers or those representing localities where a smaller amount of business is done, and which do not require as much labor, on account of the lesser number of postings, it would be quite possible to have one bookkeeper for from six to eight ledgers,

It will thus be seen that there may be one ledger, four ledgers or eight ledgers in a series, altogether depending upon the amount of work necessary. These series may be designated by number or letter, but it is preferred to use the letters; as series *A*, series *B*, etc. One bookkeeper has absolute charge of the postings to his series, both debit and credit, and must see that it is kept in proper balance with the general bookkeeper's controlling account for that series.

Arrangement of Cash Sheets. For "banks of ledgers," as ledger series are usually called, it is best to have a detail cash sheet covering each series. After the remittances have been noted on the letters or accompanying remittance blanks, the latter are assorted according to the division in which they belong and then each division is re-assorted by town, alphabetically, and the entry of the amount of the remittance, cash discount, etc., is made upon the detail cash sheet. The form for the detail sheet is very simple and is shown in Fig. 34.

The posting to the different ledgers is made from these detail sheets and the total amount as shown thereon is entered in the cash book and charged in one daily item to the ledger series which it represents.

Rebates and Returns. All credits to accounts for rebates, allowances, or returned goods are made through the duplicate or triplicate carbon system similar to the bill-and-charge. The credit sheets are distributed and arranged for the different series of ledgers in the same manner as the detail cash, so that the posting to the ledgers is facilitated as much as possible. The total amount is credited through the journal to each of the different series at the end of each month and debited to merchandise sales. Thus, the credits derived from the detail cash sheets, as entered in the general cash, and from the credit memoranda, as entered in the journal and posted therefrom, will exhibit the entire credit entered in or posted to the series of ledgers represented for the month.

Orders and Sales Records. The handling of orders is very similar to that of other credit-giving catalogue houses. Goods are billed with a carbon copy (sometimes more than one) under the bill-and-

charge system, the duplicate being the charge sheet. The charge sheets for the day are collated and arranged in a manner similar to that given above for credit memoranda, and the postings are made to the proper ledger series by the bookkeeper in charge.

Occasionally there is a charge item to some ledger account through the cash book. In such cases, it is usual for the bookkeeper

[illegible]

Fig. 34. Detail Cash Sheet for Mail Orders

to make out a slip giving the series letter, town and state, name of customer, amount, and nature of charge, from which slip the posting is made to the proper account.

The detail of the correspondence filing, follow-up, and catalogue work is exactly the same as that employed by other mail-order houses. The handling of the general accounts is also very similar.

OTHER CATALOGUE HOUSES

The success of the mail-order business in connection with general merchandising has caused many special enterprises of this

character to be established. The various phonograph makers have established a paying mail-order business, selling their machines on the installment plan in every part of the world. Automobile dealers have also recently taken up this method of selling and many of them are engaged in a lucrative and increasing business. Department stores and piano dealers have been selling pianos on the "catalogue plan" for a number of years, but recently the business has received a new impetus. Almost every conceivable article for human use, amusement, or education is now being sold on the mail-order plan.

One company in Chicago has for a number of years been selling sash doors and blinds, lintels and ornamental wood work by catalogue, employing no traveling men whatever. This establishment does the largest business in the world in their line, by mail. As they have two or three factories for the production of the goods they sell, the accounting proposition in connection with their business is increased by the various elements which go to make up factory accounting and proper factory costs.

It will be understood from the complicated nature of the business under discussion that no set rules can be laid down for the accounting department, but this will give a fair idea of the principal necessities in this department, which must be extended and amplified as the necessities require.

SPECIAL ACCOUNTING FORMS

1. Bookkeeping, if it is to meet the demands of modern accounting methods, must not only supply a complete and accurate record of the past transactions of a business and show both its financial condition, or net worth, on the different settlement dates and the amount of gain or loss during the intervening periods, but it must supply also, by properly arranged data, the means of forecasting, with some degree of probability, the financial results to be expected from any proposed policy of management both as a whole and in its more important divisions. The successful bookkeeper of the future must be more than a mere recorder of facts. He must know the import of the facts which he records and their bearing upon the purpose of the business in which he is employed and he must be able so to classify and so to present those facts that they shall reflect proper conclusions as to anticipated as well as past transactions.

The principles of bookkeeping are the same regardless of the nature, size, or condition of a business. But data of the greatest importance in one business may be of little or no concern to another.

Laying out the general plan is the function of the accountant. He analyzes those elements which bear on the success of the business, and determines what facts, when properly recorded, will furnish the clearest and most understandable history. He determines what classes of facts should be recorded and plans how they are to be recorded—in what form they will present the desired results. His work should provide a system of records capable of presenting the most vitally important information, with a minimum expenditure of labor but as no machine can be really efficient without intelligent guidance, so no scheme of accounting can yield the best results without the services of a bookkeeper who knows and understands both the accounting scheme and the nature of the data to be handled by it.

The increasing demand for more intelligible records is the keynote to the newer accounting as well as to the newer bookkeeping methods. Special accounting forms more or less suited to

the records which they are to contain, are now made for every purpose. Labor-saving devices and methods have minimized the drudgery of bookkeeping.

The bookkeeper who would rise above mediocrity requires something besides the ability to record business transactions in the proper columns of books prepared for him. He must know how to devise forms and books, how to adapt correct principles to the building of a system of bookkeeping for any line of business. If certain facts assume importance, he must know how those facts can best be obtained and recorded.

To assist in familiarizing the student with the more modern methods, this section is devoted to illustrations and descriptions of special forms of books for various purposes. The student should devote careful study to these forms, for while they have been in the main devised to meet special conditions, the principles can be adapted to any line of business where similar conditions exist.

SPECIAL LEDGERS

2. Loose Leaf Ledgers. A loose leaf ledger is one in which the leaves are removable. Instead of the sheets being bound in solid book form, each leaf is a separate sheet ruled for one ledger account. The sheets are filed or bound in what is known as the binder, being securely held in place by a mechanical device. The binder can be locked so that only the person holding the key can insert or remove the sheets.

The loose leaf ledger is indexed either numerically or alphabetically. When the numerical method is used the sheets are numbered and placed in the binder in numerical order which gives the same arrangement as a bound book. A separate index is required with the numerical method. The alphabetical method of indexing necessitates the use of sheets on the edges of which are tabs or projections printed with the letters of the alphabet. These index sheets are placed in the binder in alphabetical order and the ledger sheets are placed between them. The alphabetical method is preferred by many as it makes the ledger self-indexing. Another method of indexing is a combination of the alphabetical and numerical. The alphabetical index sheet is used, and under it are filed all accounts of persons whose names begin with that letter. These sheets are num-

cards can be taken out and placed in another tray without disturbing their arrangement.

There are two general plans of indexing the card ledger—alphabetical and numerical. The alphabetical method consists of a set of guide or index cards between which the cards are filed. This

NAME															
ADDRESS															
DATE		NATURE OF ADVERTISEMENT				LINES INCHES		TIME		DEBITS		DATE		CREDITS	

Fig. 3. Ledger Card for Publishers

index may consist of one index for each letter of the alphabet, a smaller number with two or more letters on one index, or a much larger number subdividing the alphabet into as many parts as may be necessary. In planning an index for a card ledger, a safe rule to follow is to provide one index card for every ten ledger cards.

A subdivision of the alphabetical index is the geographical or territorial. This divides the ledger by states and towns. Guide cards, printed with the names of the states, provide the main division; other guides, printed with names of towns, subdivide the state sections; and where necessary, alphabetical guides subdivide the names in the towns. If desired, the ledger may be divided into territorial sections, as East and West; or each section may include the territory covered by one salesman.

A numerical index divides the cards by tens and hundreds. Guide cards numbered by hundreds—100, 200, etc.—provide the main divisions. Between these are placed guides numbered 10, 20, 30, etc., to subdivide these sections by tens, and the ledger cards are filed in numerical order between these guides. To facilitate locating any number desired, the cards themselves are made with small projections numbered from 0 to 9 to represent the units. Each card bears one tab, and all tabs bearing the same unit are in the same

which will prevent the removal of a card, except by the one who has the key.

These suggestions may be of assistance to the bookkeeper who is called upon to use a card ledger:

Never leave ledger cards lying on the desk. When you leave your work, put them back in the file, where they belong.

Before leaving the office, lock the ledger so that no one can remove a card in your absence.

If your superior asks you to see a certain ledger account, do not give him that one card. He may lose it. Give him the entire tray, with the cards securely locked. Should he insist on having that one card, ask him to give you a receipt for it.

Some special forms of ledger cards are illustrated. Fig. 2 is a form used by a dental supply house. The special feature of the form is a separate column for each different class of goods purchased by the customer. Fig. 3 is used by a publisher for advertising accounts. Fig. 4 is a conventional balance ledger form adapted for use in almost any line of business.

4. Tabular Ledger. This is a ledger in which the names are written down the side of the page, with debits, credits, and balances extending across the page. Columns are arranged to group entries during uniform periods, as a month, week, or day. A special feature of this style of ledger is that it can be more quickly balanced and proved than any other style. To prove this ledger add the balances at the end of the preceding period to the debit postings of the current period. This will equal the total of the credit postings added to the new balances, if the balances have been correctly extended. The postings to all of the accounts on a page—30 to 40—can be footed at one operation, saving much time.

Fig. 5 is a form of a tabular ledger used by banks, known as the *Boston bank ledger*. It is specially arranged to exhibit daily balances, as it is necessary that the depositor's ledger be balanced daily. This form can be used in a mercantile business, but as balances are not required daily, the form shown in Fig. 6 is better adapted to the purpose. These tabular forms of ledgers are not commonly used except in banks.

5. Balance Ledgers. Three forms of balance ledgers are illustrated, each specially adapted to some particular class of business.

[illegible]

Fig. 5. Boston Bank Ledger

[illegible]

Fig. 6. Commercial Tabular Ledger

[illegible]

Fig. 8 is provided with two balance columns, for debit and credit balances. This form saves time in taking trial balances, as it is seen at a glance whether the balance is a debit or a credit.

[illegible]

The feature of Fig. 9 is several credit columns to one debit column. This form is largely used where sales are made subject to periodical payments. It is well adapted for installment accounts, rent accounts, insurance accounts, and similar classes. The number

PAY ROLL

[illegible]

Fig. 15. Departmental Pay-Roll Record for Piece Work and Day Workers

PAY-ROLL RECORDS

8. The designing of pay-roll records to meet the special conditions in the great variety of manufacturing industries, offers a wide field for the ingenuity of the bookkeeper or accountant. Where all employes are paid a stated wage and their employment in one department is continuous, the problem is a simple one, resolving itself into a mere record of the number of hours worked each day, the rate, and the amount due. But this condition seldom exists.

In most industries more complex problems are encountered. The same employe may be called upon to work in more than one department during a pay-roll period, or he may do several different kinds of work in the same department. In either case the form for the record must be so constructed as to furnish complete information relative to the cost of the different classes of work. Elaborate systems for gathering records of time on each detail of the work are employed in most modern factories, and the pay-roll record or time book is arranged for a consolidation of these detailed records.

Fig. 15 illustrates a form used in one factory for a distribution of time records where men are employed on different kinds of work in different departments, and on both day wage and piece work plans. In this form provision is made for the record in each department, and each day's record is divided between time and piece work. Several lines are set aside for each employe, so that the record will be complete for each kind of work. At the extreme right, department totals are extended. These are quickly calculated for the reason that while an employe may do different kinds of work and in different departments, the same operation is not performed in more than one department. To provide for records of more kinds of work this principle can be carried still farther by allowing more space for each employe, and in some cases a full sheet is assigned for each. In one factory the pay-roll book is loose leaf, one sheet being used for each employe. Each side of the sheet holds the record for two weeks, and by using both sides, it gives a complete record for four pay-roll periods.

9. **Combined Pay-Roll and Check Register.** Many industries pay their employes by means of checks instead of in currency. Special pay checks are used which merchants willingly cash as an accommodation to their customers. Whenever the check system of payments is adopted it is best to carry a special bank account for the purpose.

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**The
theoretical man
knows *why*. The
practical man
knows *how*. The
man who would
lead must know
why and how.**

